Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Unbundled Access to Network Elements	)	WC Docket No. 04-313
	)	
Review of the Section 251 Unbundling	)	CC Docket No. 01-338
Obligations of Incumbent Local	)	
Exchange Carriers	)	

UNE FACT REPORT 2004

Prepared for and Submitted by
BellSouth, SBC, Qwest, and Verizon

October 2004

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I. COMPETITIVE OVERVIEW

Local telecommunications markets are vastly more competitive today than they were in 1996, and very much more competitive than they were at the time of the *Triennial Review* in 2002. *See* Table 1. No one can seriously doubt that facilities-based, intermodal competition will continue to grow robustly going forward.

In the mass market, the most prescient and effective competitors have turned out to be companies that never bought a single UNE from an ILEC, and that certainly do not need ever to do so. Cable companies now offer circuit-switched telephony to about 15 percent of all U.S. households, and among those households, almost 1 in 5 already subscribe. Far more significantly, however, numerous competitors are now providing low-cost, high-quality voice service to mass-market customers using *packet* – not circuit – switches. Approximately 90 percent of U.S. households now have access to a broadband connection from a competitive supplier. By the end of 2004, cable companies will be offering voice-over-IP services to nearly a quarter of all U.S. households, and to nearly half by the following year. Other voice-over-IP providers, including established companies like AT&T and upstarts like Vonage, are currently offering voice-over-IP services to even greater numbers. Wireless carriers are aggressively competing for both lines and traffic: since the time of the *Triennial Review*, the number of wireless lines has grown from 129 million to 161 million, while the number of wireline lines has declined; the percentage of users giving up their landline phones has grown from 3-5 percent to 7-8 percent; and wireless traffic has grown from 16 to 29 percent of all voice traffic and to 43 percent of long-distance traffic.

In the provision of high-capacity facilities to enterprise customers, competition has likewise increased since the time of the *Triennial Review*. In addition, as a result of the D.C. Circuit's decision in *USTA II*, the Commission is now required to consider forms of competition that it chose to ignore in the past, such as special access purchased from incumbents, and also is required to take a much broader view of where competition is possible. Under this approach, the evidence shows that competing providers are successfully providing high-capacity services wherever demand for those services exist, by using a combination of their own or other alternative facilities and special access services. Competing providers have deployed an average of nearly 20 networks in each of the top 50 MSAs, and have collocated fiber in at least 55 percent of the wire centers that account for 80 percent of BOC special access revenues. A large and growing number of businesses also are obtaining some of their high-capacity services from cable companies and fixed wireless providers. In addition, competing carriers are using special access to serve business customers of all shapes and sizes. In fact, more than 90 percent of the high-capacity loops that carriers purchase from the Bell companies, which they then use to serve their own customers, are sold as special access as opposed to UNEs. Competition is accordingly thriving in all of the markets in which high-capacity facilities are used. Competing carriers control a third or more of all special access revenues; more than half of the market for large enterprise customers; and approximately three-quarters of the market for high-capacity data services, which now represent the majority of corporate telecom spending.

Table 1. Competitive Developments					
		1996 LCO	**1999 URO**	**2002 TRO**	**2004**
Broadband	% homes with access to cable modem	0	20	71	87
	% homes subscribing to cable modem	0	<1	8	15
	% homes with access to voice over IP	0	0	0	87
	% homes with access to 2-way satellite data	0	0	>90	>90
	MSAs with fixed wireless broadband	0	0	58	>70
Wireless	% pop. in counties with 3 or more operators	n/a	88	94	97
	% pop. in counties with 5 or more operators	n/a	69	80	88
	% pop. subscribing to wireless voice	17	32	45	54
	% pop. subscribing to wireless data	0	0	3	10
	Wireless subscribers giving up wireline	0	<1M	5M	11M
Wireline CLEC Switching	CLEC Circuit Switches	65	700	1,200	1,200
	CLEC Packet Switches	75	1,260	8,700	8,700
	Homes with access to circuit-switched cable telephony	0	<2M	10M	17M
	Circuit-switched cable telephony subscribers	0	80,000	2.5M	3.2M
Wireline CLEC High-Capacity	Average Number of CLEC Networks in Top 50 MSAs	n/a	15	18	19
	Route Miles of Fiber (local and long-haul)	47,000	100,000	308,000	324,000
	Buildings Served Directly by CLEC Fiber	24,000	n/a	30,000	32,000
Sources: See Appendix H. n/a= not available.					

A. Facilities-Based Competition for Mass-Market Customers

Competitive Services. High-speed-data and wireless services can no longer properly be viewed as just specialized adjuncts to traditional, narrowband, wireline networks. The formerly discrete markets are rapidly coalescing into one: cable companies offer data services; voice-over-IP services ride on data networks; and wireless phones are ubiquitous. The new networks support all the same services as the old, plus many more. And taking into account the quality and capabilities of the services provided, prices are fully competitive.

Voice-over-IP providers now market the service, and most customers buy it, as a primary-line replacement. *See* § II.A. Voice-over-IP service now matches conventional voice service in functionality, voice quality, and backup power. The service can reach every phone in a typical home. Number portability is available – customers can and do bring their old phone numbers with them when they switch. Prices are 30 percent or more below comparable circuit-switched offerings. The economics of providing voice-over-IP service are radically different from the forms of competition they replace; with minimal capital expenditures of between $5-$9 per month per subscriber, new entrants can now offer service to more than 90 percent of U.S. households using facilities supplied by companies other than incumbent LECs.

Wireless service also now competes directly against traditional wireline service. *See* § II.B. The quality of service is now comparable (and in some respects, such as mobility, superior), and wireless prices are fully competitive; indeed, wireless service is now cheaper for many customers, because it bundles in long-distance and enhanced-calling features. Finally,

competitors can and do provide circuit-switched service that is identical to ILEC service, by using their own switches together with loops they obtain from the incumbent or, in the case of cable operators, loops they supply themselves.

Pricing plans for bundled services reflect the convergence of these markets. Wireline, wireless, and voice-over-IP providers now offer comparable packages, at directly competitive prices, in every major market in the country. *See* Table 2 & Appendix B. The bundles all include local and long-distance service, and a wide array of vertical calling features.

Table 2. Bundled Service Offerings

	Circuit-Switched		VoIP			Wireless	
	BOCs	**Cable**	**AT&T**	**Vonage**	**Cable**	**Sprint PCS**	**T-Mobile**
Price per Month	$46-$65	$45-55	$30	$25	$35-$40	$40	$40
Taxes, Fees & Surcharges*	$10-$15+	$11-$13+	$2-$4	$2-$4	$0-$4	$6+	$6+
Local	Unlimited		Unlimited			500 A; unltd. N/W	600 A; unltd. N/W
Local Toll	Unlimited		Unlimited				
Long Distance	Unlimited		Unlimited				
Call Waiting	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓
Call Forwarding	✓	✓	✓	✓	✓	✓	✓
Voicemail	✓	✓	✓	✓	✓	✓	✓

*Taxes, fees, and surcharges are approximate.
Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; unltd. – unlimited.
Sources: See Appendix H.

Competitive Facilities. Two years ago, the Commission still believed that facilities-based competition for mass-market customers would emerge only if competing carriers could connect their own *circuit* switches to the incumbent's *narrowband* loops. *See* § II.C. Recent developments have overtaken that finding. Facilities-based competition is now coming from providers that are using *packet* switches, *broadband* loops, and *wireless* networks.

Competitive networks capable of providing voice services now reach at least 90 percent of all U.S. households. *See* Appendix A. At least 90 percent of all households can buy high-speed packet-switched voice service from a competitive provider. *See* Appendix A & § II.A. Over 95 percent of households are located in areas that also are served by one or more wireless providers. *See* § II.B. About 15 percent of households can obtain traditional circuit-switched voice service from their local cable company, and cable companies are now rolling out VoIP services across the country and are expected to offer the service to more than 80 percent of households within two years. *See* §§ II.A, II.C. High-speed wireless data services are already available in some of the nation's largest markets, and wireless providers have announced aggressive plans to make wireless broadband much more widely available over the next several years. *See* Appendix A § II.

These new, facilities-based competitors have not relied – and are not relying – on the UNE platform to get their start. Equally clear is that access to the UNE platform has not

provided meaningful competition on its own. The idea that useful competition could somehow be sustained without deployment of any competitive facilities is now completely discredited. *See* Table 3.

Table 3. Independent Analysts Agree That Intermodal Competition Is Real While UNE-P Is Irrelevant

Morgan Stanley (7/04)	"UNE-P is not the threat it once was . . . The major culprits continue to be broadband substitution of second lines, wireless substitution, and VoIP in both the consumer and business space."
Fulcrum (3/04)	"Even without UNE-P, we expected continued competitive line losses for [the BOCs], as wireless competition continues to proliferate with attractive offerings that provide consumers incentive to substitute wireless for wireline services. Similarly with an announced and an effective acceleration of cable telephony, we expect line losses to continue."
Legg Mason (2/04)	"'[C]ompetitors' offering residential local exchange services based on regulatory approaches . . . have not spurred viable long-term enterprises. . . . [I]n the residential market . . . the only major facilities-based competitors in the U.S. are the wireless carriers and the cable operators."
Deutsche Bank (5/04)	"[A]s we progress into 2005, the pressure on the RBOCs will once again increase, with VoIP, cable telephony and wireless replacing UNE-P."
CIBC World Markets (6/04)	"We do not expect a rise in the RBOCs' retail rates as UNE-P is phased out, given the threat of market share losses to wireless and cable competition."
Sources: See Appendix H.	

Competition. Incumbent LECs are now losing large numbers of customer lines – and even greater shares of traffic and revenues – to cable, voice-over-IP, and wireless providers. The Bell companies' wireline voice lines now represent less than 60 percent of all "local access points" actually used by residential customers for voice and data services. *See* Table 4.[1] Well over half of residential customers already use a wireless or data network for at least some of their voice-service needs.[2] That the Bell companies themselves serve significant numbers of wireless and DSL customers does not change the competitive implications of these totals: the Bells provide broadband services in head-to-head competition with cable, and wireless services in head-to-head competition with each other. And this competition is expected to increase significantly over the next several years. *See* Table 4.

[1] *See* B. Bath, Lehman Brothers, *Consumer VoIP Threat Overdone* at Figure 1 (July 1, 2004) ("*July 2004 Lehman Brothers VoIP Report*"); *see also* G. Miller & C. Chapple, Fulcrum Global Partners, *Wireline Communications: We Believe the Industry Is Sick – Regulation is Making It Sicker* at 4 (May 16, 2003) (traditional "market share tests do not take into account the number of subscribers who may have left their landline behind for a cable telephone line or a wireless phone" or the fact that "the RBOCs are losing the broadband race at a rate of two to one.").

[2] *See* §§ II.A & II.B; *see also July 2004 Lehman Brothers VoIP Report* at Figure 4.

Table 4. Local Access Points for Residential Customers (in millions)			
	YE 2002	**2004**	**2008E**
BOC Retail	94	82	n/a
Resale/UNE-P*	12	17	n/a
Total	**106**	**100**	n/a
Wireless Displacement	5	11**	22
Cable Modem	11	17	34
Cable Telephony and VoIP	3	4**	13
DSL Subscribers	4	8	22
Total	**23**	**39**	**91**
Wireline Share of Total	82%	72%	n/a
BOC Wireline Retail Share of Total	72%	59%	n/a

* 2002 data apply known proportion of residential resale/UNE-P subscribers as of 1H02 to YE02 totals; 2004 data apply proportion of BellSouth's residential resale/UNE-P subscribers as of 1H04 to 2Q04 totals for all BOCs.
** Year-end 2004 estimates.
Sources: *See* Appendix H.

Voice-over-IP services now clearly define the center of wireline voice competition – any customer with access to broadband service now has access to competitive voice-over-IP service. *See* § II.A. As of mid-2004, providers included AT&T, a new class of all-IP-based competitors like Vonage, and numerous other national or regional players. Cable companies are offering VoIP service to over 5 million homes, with plans to push that total up to 24 million by year end, over 40 million by the end of 2005, and over 90 million by the end of 2006. AT&T is already offering service in more than 120 major markets, and Vonage and several other all-IP-based providers operate nationwide.

Wireless competition is at least equally robust. *See* § II.B.1. At least 14 percent of U.S. consumers now use their wireless phone as their primary phone, and at least 7-8 percent have given up wireline service entirely. As of year-end 2004, wireless will have displaced 11 million wireline access lines, a number projected to reach 22 million by 2008. *See* § II.B.1. Incumbent wireline phone companies are losing about 8 million lines of circuit-switched voice service (retail plus wholesale) every year; wireless providers are adding about 20 million subscribers per year.

Even when they do not replace wireline service outright, wireless and data services compete vigorously for traffic and revenues. According to one estimate, wireless now accounts for over one-quarter of voice-call minutes.[3] The fraction is even higher for long-distance calls because wireless service plans do not typically distinguish between local and long distance. According to one estimate, over 40 percent of long-distance calls are now made on wireless phones; wireline toll minutes, by contrast, have fallen 40 percent over the past five years. *See*

[3] *See* D. Janazzo, *et al.*, Merrill Lynch, *The Next Generation VIII* at 41 (Mar. 15, 2004) (estimating that 23 percent of voice minutes in 2003 were wireless, and that wireless could account for approximately 29 percent of U.S. voice minutes in 2004).

§ II.B.1. These numbers are especially significant because long-distance access charges generate a disproportionate share of local revenues.[4]

Data networks have similar competitive impacts, even when not used as a conduit for voice-over-IP service. Household purchases of second lines to be used for dial-up Internet service accounted for much of the rapid line growth in the late 1990s; the rise of broadband services reversed that trend. E-mail and instant messaging clearly substitute for many traditional voice calls.[5] U.S. users dispatch some 9 billion messages per day;[6] if just 5 percent of these substitute for a 90-second voice call, this data traffic has displaced more than 10 percent of the voice traffic that would otherwise have been handled by the incumbents' networks.[7]

B. Facilities-Based Competition for Enterprise Customers

Competitive Services. Enterprise customers make up the most lucrative segment of the telecom market. *See* §§ III.A, III.E.2. These customers buy high capacity dedicated-access lines. These lines are used heavily for long distance voice and data services.[8] As a result, the three incumbent interexchange carriers – AT&T, MCI, and Sprint – have traditionally dominated the provision of services to enterprise customers. *See* § III.E.2. This market segment also has attracted entry from many other competitors as well, such as Level 3 and XO. Both cable-based and fixed-wireless providers have also begun to compete aggressively for enterprise customers, particularly for data services. *See* §§ III.D, III.E.2. As in the mass market, however, high-speed data services now also provide competitive substitutes for delivering voice services. In addition, there is intense competition in the provision of switched voice services to enterprise customers from competitors using traditional circuit switches.

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[4] *See, e.g.*, J. Bazinet, *et al.*, JP Morgan, *The Art of War* at 7 (Nov. 7, 2003) ("[A]ccess revenue – which makes up around 15% of the local voice market – is experiencing rapid declines due to the migration of wireless long-distance minutes onto the wireless network.").

[5] *See, e.g.*, D. Schoolar, In-Stat/MDR, *State of the US Carrier Market* at 6 (Oct. 2003) ("Consumers are using e-mail and instant messaging in place of a phone call."); C. Golvin, *et al.*, Forrester, *Sizing U.S. Consumer Telecom*, at 19 n.5 (Jan. 2002) ("[a]lternate forms of communications, such as email and instant messaging, []reduce long-distance minutes of use.").

[6] *See* K. Thies, *E-mail and Records Management in the Legal Environment*, Legal Tech Newsletter (Nov. 14, 2003) ("Almost 9 billion e-mails are sent every day in the United States."); *see also* B. Silverman, *IM Viruses Are Latest Threat to the Networks*, New York Post (June 13, 2004) ("Almost 80 million Americans use instant-messaging services at home or work, according to an April 2004 Nielsen/NetRatings survey."); E. Stein, *Will IM Pay?*, CFO Magazine (May 2004) ("Radicati Group, a technology market research specialist, reckons there are already 60 million business IM accounts. IM could have as many as 182 million business users by 2007, claims Ferris Research.").

[7] Ind. Anal. & Tech. Div., WCB, FCC, *Trends in Telephone Service* at Table 10.1 (Aug. 2003) (Total 2001 Dial Equipment Minutes of 4.8 trillion divided by 2 yields 2.4 trillion conversation minutes; 246 billion/2.4 trillion = 10.3%) (5 percent of 9 billion is 450 million multiplied by 365 days yields 164 billion multiplied by 1.5 (90 seconds) yields 246 billion minutes annually).

[8] D. Barden, *et al.*, Banc of America Securities, *Verizon Communications Inc.* at 3 (Jan. 16, 2004) ("[L]arge enterprise customers spend substantially more on long distance voice and data service than they do on local service.").

Competitive Facilities. Since 1996, competing carriers have invested nearly $75 billion in new infrastructure, the majority of it to serve enterprise customers;[9] the number of switches and fiber-route miles deployed has increased by 2,000 and 590 percent, respectively. *See* Table 1. By mid-2004, competitors had deployed an average of about 19 networks in each of the top 50 MSAs, and at least one network in 98 of the top 100 MSAs. *See* § III.A & Appendix D. These networks consist of approximately 324,000 route miles of fiber. Revenues earned by wireline CLECs have grown 25-fold – from $2 billion 1996 to nearly $50 billion today.[10]

Cable operators have recently begun to target business customers aggressively, deploying fiber to office buildings and extending their hybrid fiber-coax networks to business districts. *See* § III.E.2. Cable operators are now providing service to business customers in at least 90 MSAs.[11] Cable companies report that their networks already reach millions of potential enterprise customers, and that the networks are being extended rapidly to reach still more. Fixed wireless providers are now operating in nearly 75 MSAs, and fixed wireless spectrum is being sold on a wholesale basis in each of the top 150 MSAs. *See* § III.D & Appendix G. Many CLECs are now using fixed wireless to expand their fiber networks.

Competition. Enterprise customers typically obtain local access to voice and data services through a variety of competitive alternatives. The Bell companies' switched and dedicated access lines now represent less than half of all "local access points" used by enterprise customers for voice and data services. *See* Table 5.

Switched Access Lines. In 2003, the Commission concluded that competitive switches had been so widely deployed that they could economically be used to serve enterprise customers throughout the country; a market-by-market analysis was therefore unnecessary.[12] The Commission cited data that, as of year-end 2001, CLECs were serving about 9 million business lines, or about 20 percent of switched lines provided to enterprise customers;[13] the same source

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[9] *See* ALTS, *The State of Local Competition 2004* at 10 (July 2004) ("*2004 ALTS Report*").

[10] *See 2004 ALTS Report* at 8.

[11] *See* Cox Business Services, *Carrier Markets*, http://www.coxbusiness.com/carriermarkets.pdf; Lightpath, *About Lightpath*, http://www.lightpath.net/Interior7.html; Road Runner Business Class, *National Presence*, http://www.rrbiz.com/RoadRunner/index.asp?sid=1; TelCove, *Fiber Infrastructure*, http://www.telcove.com/network/090304%20Network%20Infra.pdf. This statistic does not include areas served by Comcast Commercial Services and Charter Business Networks. Comcast Commercial Services reports serving all 41 states where its parent provides service, while Charter Business Networks reports serving 35 states. *See* Comcast Commercial Services, *Our Network*, http://www.comcastcommercial.com/index.php?option=content&task=view&id=4&Itemid=34; Charter Business Networks, http://www.charter-business.com/default.htm.

[12] *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978, ¶ 451 (2003) ("*Triennial Review Order*") (CLECs are "competing successfully in the provision of switched services"); *id.* ¶ 453 ("there are few barriers to deploying competitive switches to serve customers in the enterprise market"); *id.* ¶ 452 ("The revenue opportunities associated with serving DS1 enterprise customers generally are sufficient to justify the sunk and fixed costs associated with using and installing the switch.").

[13] *Triennial Review Order* ¶ 300. Although the BOCs provided evidence that competing carriers were providing "13-20 million self-switched business lines," those totals included lines that competing carriers were serving using special access. The Commission held that: "Because the Commission places little weight on the

puts the year-end 2003 total at about 25 percent.[14] Reviewing these same data, one analyst has concluded that "[i]n certain denser business centers, the penetration of [competitive] business lines appears to be above 40%."[15] Moreover, as the Commission acknowledged, these totals fail to count customers served by CLEC switches and ILEC special access lines.[16] Including these lines – 16 million lines, by the Commission's estimate, as of early 2002[17] – raises these totals significantly.

Table 5. Local Access Points for Enterprise Customers

	2002	2004
BOC Switched and Dedicated	117 million	126 million
BOC *Retail* Switched and Dedicated*	67 million	67 million
CLEC Switched and Dedicated (voice-grade equivalents)**	147 million	156 million

* Assumes that the percentage of voice-grade equivalent special access *lines* that BOCs provide directly to end users is the same as the percentage of special access *revenues* they generate from end-users – which was 36 percent in 2002. *See* J. Lande & K. Lynch, Ind. Anal. & Tech. Div., WCB, FCC, *Telecommunications Industry Revenues 2002* at 14 (Table 5, Line 305) and 18 (Table 6, Line 406) (Mar. 2004).

** Includes lines provided via resale of ILEC special access, but does not include lines provided to residential and small business customers as reported by CLECs to the FCC.

Sources: See Appendix H.

Dedicated Access Lines. In 2003, the Commission found that competing carriers had deployed extensive fiber networks and were using them to provide high-capacity loop and transport services.[18] The Commission concluded, however, that it lacked sufficient information to determine the precise routes served, and left it to state regulators to conduct a market-by-market analysis.

As of year-end 2002, competing carriers were telling investors that they collectively served nearly 170 million voice-grade equivalent lines, most of which were dedicated high-capacity lines. Many competing carriers – including AT&T and MCI, the two largest – abruptly stopped making such claims after ILECs passed them on to the FCC. *See* Table 6.[19] As of year-end 2002, by contrast, the Bell companies collectively served about 93 million voice-grade equivalent special access lines. The BOC total includes an estimated 60 million voice-grade

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availability of special access in its impairment analysis, we do not rely on evidence that includes such lines." *Triennial Review Order* ¶ 300 n.872.

[14] *See* Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of December 31, 2003* at Table 2 (June 2004) ("*June 2004 Local Competition Report*").

[15] Michael Balhoff, Managing Director, Legg Mason, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC, at 4 (Feb. 4, 2004) ("*Balhoff/Legg Mason Testimony*").

[16] *See Triennial Review Order* ¶ 300 n.872 ("[T]he Commission has instructed competitive carriers to exclude local services provisioned over special access facilities in their reported data.").

[17] *See Triennial Review Order* ¶ 437.

[18] *See, e.g., Triennial Review Order* ¶ 370; *see also id.* ¶ 398.

[19] The 14 carriers that still report such data were serving 54 million voice-grade equivalent lines as of year-end 2003. *See* Table 6.

equivalent lines sold to competing carriers.[20] Removing all forms of mass-market lines from CLEC-reported VGEs, competitors thus appear to be providing approximately 88 million voice-grade equivalent enterprise lines over their own facilities, most of which are high-capacity lines.[21] Competitors, in other words, appear to be providing *more* high-capacity lines to end-users over their own facilities than the BOCs, even excluding the fact that competitors are capable of and are connecting many additional customers to their networks using ILEC special access.[22]

Table 6. CLEC Reporting of Voice-Grade Equivalent Lines

	2001/2002	2003/2004
MCI	76.4 million	No longer reports
AT&T	>40 million	No longer reports
Time Warner Telecom	18.2 million	19.8 million
XO	17.4 million	16.7 million
KMC Telecom	4.1 million	6.7 million
TelCove	4.6 million	No longer reports
Xspedius	2.8 million	3.4 million
Cox	2.2 million	~2.6 million
Allegiance	1.4 million	1.4 million
Focal	691,000	559,000
CoreComm/ATX	510,000	523,000
Choice One	555,000	>500,000
PaeTec	387,000	469,000
Pac-West	327,000	407,394
US LEC	n/a	654,914
CTC	615,000	370,000
Integra	143,000	207,000
SureWest	78,000	146,000

Sources: See Appendix H.

[20] FCC, *Statistics of Communications Common Carriers 2002/2003 ed.* at Table 2.6 (Feb. 2004). This estimate is based on the fact that BOCs generate nearly two-thirds of their special-access revenues in sales to competing carriers, rather than to end users. *See* J. Lande & K. Lynch, Ind. Anal. & Tech. Div., WCB, FCC, *Telecommunications Industry Revenues 2002* at 14 (Table 5, Line 305) and 18 (Table 6, Line 406) (Mar. 2004).

[21] Calculation is as follows: (a) 170 million voice-grade equivalent CLEC lines minus 60 million VGEs provided by BOCs to CLECs yields 110 million; (b) 110 million minus 14.5 million CLEC residential lines as of year-end 2002, as reported by the FCC, yields 96 million voice grade equivalent lines, *see June 2004 Local Competition Report* at Table 2; (c) 96 million minus 7.8 million CLEC business lines provided via UNEs and resale, *see id.* at Tables 2 & 4.

[22] This compares 88 million CLEC retail facilities-based voice-grade equivalents, *see* note 21, *supra*, to 67 million BOC retail lines, *see* Table 5, *supra*.

Moreover, these estimates are almost certainly too low, because they consider only traditional-CLEC service; enterprise customers, however, are increasingly relying on alternative technologies, particularly for high-speed data services. An estimated 41 percent of large businesses (1,000+ employees), 32 percent of mid-sized businesses (100-999 employees), and 44 percent of small businesses (5-99 employees) are using cable modem service for at least some high-capacity services. *See* § III.E.2.d. And an estimated 40 percent of large business, 29 percent of mid-sized businesses, and 23 percent of small businesses are now using fixed wireless services for at least some high-capacity service.

It is estimated that three carriers – AT&T, MCI, and Sprint – account for more than half of all revenues from large enterprise customers, which generate the overwhelming majority of demand for high-capacity services.[23] These three carriers account for an even larger share of packet-switched data revenues – 79 percent of Frame Relay revenues and 60 percent of ATM revenues – which are now the single largest expenditure by enterprise customers as a whole.[24] These three major carriers are also the main providers of IP Virtual Private Network and other specialized high-speed data services.[25] Many additional carriers, such as Level 3 and XO, also compete in this market segment.

In sum, the evidence now establishes that competing carriers provide at least as much competitive high-capacity transport as competitive switching. Competitors can reach enterprise customers over their own facilities wherever there is any significant demand for their services.

C. Outlook

Data compiled by the Commission establish that ILECs were serving 29 million fewer access lines in December 2003 than they were in December 1999; 21 of the 29 million lost ILEC lines had served mass-market customers.[26] As the Commission itself pointed out in the *Triennial Review Order*, "we have seen for the first time a decrease in the number of retail access lines served by the incumbent LECs."[27] This decline has continued – ILECs lost another four million retail access lines in the first half of 2004 alone.[28] BOC local voice revenues are likewise

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[23] *See* J. Bazinet, *et al.*, JP Morgan, *MCI Inc. – Initiating Coverage with Overweight* at Table 1 (Sept. 17, 2004); R.D. Lynch, *et al.*, Lehman Brothers, *Enterprise Telecom Services* at Figure 13 (Nov. 11, 2003) ("*Lehman Enterprise Report*"); § III.E.2.

[24] *See* M. Bowen, *et al.*, Schwab Soundview Capital Markets, *AT&T Corp.* at 3 (Jan. 21, 2004); A. Quinton, *et al.*, Merrill Lynch, *The Telecommunicator — WorldCom Survey Results — Industry Implications of Current Customer Thinking* at 2-3 (Feb. 6, 2003); § III.E.2.

[25] *See* H. Goldberg, In-Stat/MDR, *VPNs Take a New Look: Trends in the US IP VPN Services Market* at Table 5 (Jan. 2004); § III.E.2.

[26] *June 2004 Local Competition Report* at Tables 1 & 2.

[27] *Triennial Review Order* ¶ 53 & n.184; Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of June 30, 2002* at Table 4 (Dec. 2002); *see also July 2004 Lehman Brothers VoIP Report* at 1 ("[O]ver the last 3 years, the RBOCs have been losing 5-8% of retail Consumer access lines annually.").

[28] *See, e.g.*, J. Bazinet, *et al.*, JP Morgan, *US Cable, DBS and Telecom: 2Q04 Quarterly Preview* at Table 5 (July 9, 2004) (estimate for second quarter 2004); *see also Balhoff/Legg Mason Testimony* at 6 ("[H]igher [access line] losses [by the BOCs in the last two quarters of 2003] are due to an acceleration in the movement toward wireless services and away from wireline telephony.").

declining rapidly, both in absolute terms, and even more significantly as a percentage of total industry revenues. *See* Table 7.

Table 7. BOC Local Voice Revenues Are Rapidly Declining

	2000	2002	2004E	2007E
BOC Local Voice Revenues*	$79B	$72B	$63B	$56B
Other BOC Revenues	$52B	$62B	$72B	$80B
Total Industry Revenues	**$306B**	**$319B**	**$324B**	**$331B**
BOC Local Voice as % of Industry Total	26%	23%	19%	17%

*Including wholesale. *Source:* J. Bazinet, *et al.*, JP Morgan, *The Art of War* at Table 25 (Nov. 7, 2003).

These trends will not be reversed. Industry analysts are unanimous: the incumbents' narrowband, circuit-switched wireline networks are being rapidly overtaken by the rise of high-speed packet-switched data networks and wireless alternatives. *See* Table 8. The projections are equally uniform and clear on the other side of the competitive ledger: rapid growth in penetration and usage of wireline broadband, voice-over-IP, wireless voice, and wireless broadband, will continue. *See* Table 9.

Table 8. Widespread Agreement That BOCs Will Continue To Lose Access Lines and Revenues to Intermodal Competition

	BOC Access Lines and Revenues Are Declining	Due to Intermodal Competition
Lehman Brothers (7/04)	"Over the last 3 years, the RBOCs have been losing 5-8% of retail Consumer access lines annually . . .	. . . due largely to DSL and cable modems cannibalizing the second phone line business, while wireless substitution and VoIP negatively affect the primary line business."
Deutsche Bank (1/04)	Between 2005 and 2008 "the RBOCs are likely to lose up to 20% of retail residential lines . . ."	. . . due "to cable telephony and VoIP."
Needham & Co. (12/03)	"[L]ine losses are accelerating and legacy products [are being] cannibalized . . .	. . . by packet-switched substitution. . . . [the] local loop . . . is not competitive with more efficient networks."
JP Morgan (11/03)	"RBOCs should see 9% annual declines in access lines."	"Wireless substitutes for wireline, IP cannibalizes ATM and legacy voice, broadband pressures dial-up and private line."
Bernstein (12/03)	"RBOCs are expected to see annual attrition of nearly 4% of consumer primary lines . . .	. . . to the cable operators."
Merrill Lynch (5/04)	"RBOCs seeing line losses remain in the 4%+ range"	"Wireless is increasingly a bona fide replacement for wireline voice services, VoIP is a reality in 2004, and cable companies . . . are positioning themselves to deliver a "triple play" bundle of video, voice and data."
Goldman Sachs (4/04)	By 2013, Goldman estimates a 40% loss in share . . .	a "20% loss in share to cable telephony, and 20% to wireless."
AG Edwards (5/04)	The RBOCs face "[c]ontinuing revenue pressure	. . . from wireless/cable substitution [and] acceleration of VoIP competition in 2005-2006."
Bear Stearns (4/04)	"[A]ccess line losses continue to plague wireline margins."	"primarily affected by competition and technology substitution."
RBC Capital Markets (1/04)	"Accelerating substitution of Wireline services . . .	. . . by Email, Instant messaging, high speed internet (DSL and Cable Modem) and Wireless"

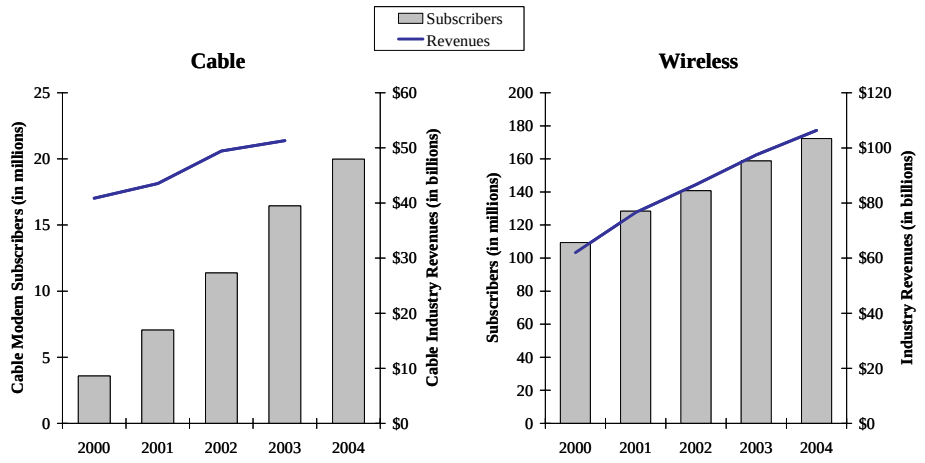
Sources: See Appendix H.

Table 9. Projected Growth of Alternative Technologies			
	YE 2004 (est.)	**2006**	**2008**
Broadband Voice			
Cable Telephony – Circuit-Switched + VoIP Subscribers	4 million	6-12 million	8-17 million
Cable Telephony – VoIP-Only Subscribers	0.5 million	4-6 million	9-13 million
Homes with Access to Cable Telephony	40 million	92-93 million	98-106 million
Independent VoIP Provider Subscribers	0.4 million	1.6 million	2.4 million
Homes with Access to Independent VoIP Providers	>100 million	>100 million	>103 million
Wireline Broadband			
Cable Modem Subscribers	20 million	26-32 million	30-39 million
Residential Cable Modem Subscribers	19 million	24 million	30 million
Homes with Access to Cable Modem	100 million	100-104 million	103-107 million
DSL Subscribers	13 million	17-25 million	20-34 million
Residential DSL Subscribers	10 million	13-16 million	16-22 million
Satellite Broadband Subscribers	0.5 million	1 million	2 million
Residential Satellite Broadband Subscribers	0.3 million	0.8 million	1.4 million
Homes with Access to Satellite Broadband	100 million	102 million	105 million
BPL Subscribers	0.03 million	0.1 million	0.2 million
Total Broadband Subscribers	33 million	47-55 million	59-69 million
Wireless Voice			
Wireless Voice Subscribers	172 million	180-203 million	194-221 million
Wireless Broadband			
Fixed Wireless Broadband Subscribers	2 million	3 million	4 million
Residential Fixed Wireless Subscribers	2 million	2 million	3 million
Mobile Wireless Data Subscribers*	29 million	n/a	75 million

* Includes subscribers to 2G, 2.5G, and 3G services.
Sources: See Appendix H.

The investment community certainly recognizes how fundamentally the competitive landscape has changed. In the bubble years immediately after 1996, money poured into startups that promised quick gains from facilities-free competition – highly speculative business plans centered on the arbitrage of regulated wholesale and retail rates. Today, the investment dollars are flowing into facilities-based competition. Cable and wireless companies continue to pour billions into their networks, to accommodate steady growth for traditional services and rapidly growing demand for new ones. *See* Figure 1. Every major category of facilities-based CLEC – wireline, wholesale fiber suppliers, fixed wireless, and voice-over-IP providers – is attracting investment. Significant industry consolidation has allowed these competitors to achieve improved economies of scope and scale. Many of these CLECs have begun to report positive earnings for the first time. *See* Table 10.

Figure 1. Steady Growth in Cable & Wireless



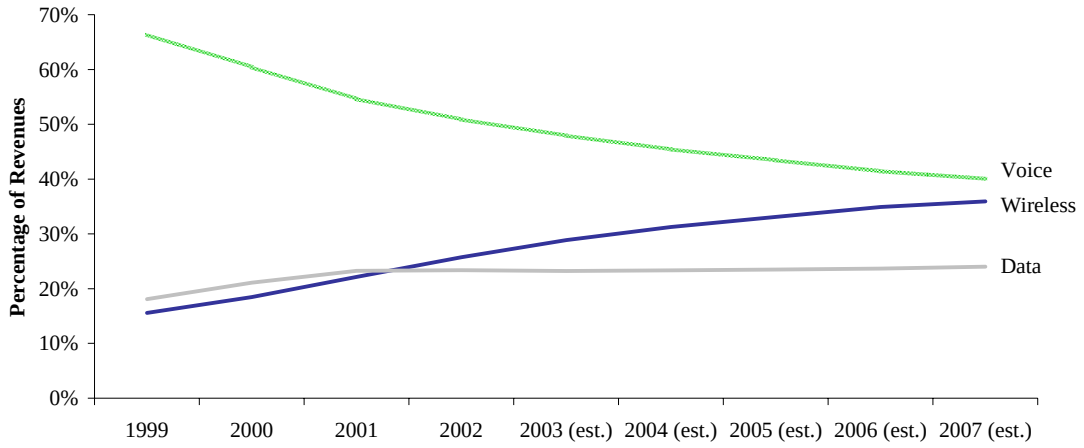
Sources: See Appendix H.

When Congress enacted the 1996 Act, ordinary wireline voice calls still generated 90 percent of the telecom industry's total revenues, with wireless and data splitting the rest. Today, the split is about 40-30-30; in four years, it is expected to be 20-40-40. *See* Figure 2.[29] Data already accounts for over three-quarters of the traffic on the backbone fiber-optic networks, and a concomitant share of the minutes of use on ordinary dial-up phone lines. When phone lines are upgraded to add high-speed data capabilities on top of voice, the "DSL" data channel provides approximately 1 megahertz (MHz) of capacity on the copper wire, as compared to the 0.004

[29] *See also July 2004 Lehman Brothers VoIP Report* at 1 ("Consumer wireline voice is a relatively small portion of RBOC revenue, below 30%.").

MHz used for voice.[30] And households that sign up for broadband data services use them much more heavily than their voice lines.[31]

Figure 2. Telecom Industry Revenues



Source: J. Bazinet, *et al.*, JP Morgan, *The Art of War* at Table 2 (Nov. 7, 2003).

With demand on this unambiguous trajectory, the future of local competition is clearly defined by the race to extend more bandwidth to the premises – and then still more. Cable operators have already deployed "fiber to the curb" ubiquitously. Both mobile and fixed wireless companies are in the process of deploying broadband capabilities in markets throughout the country.[32] This is being made possible by the licensing of large new blocks of spectrum, the designation of even larger blocks of unlicensed spectrum, the rapid evolution of wireless technology, and the build out of wireless infrastructure, all of which have expanded capacity and lowered costs. *See* Figure 3. Competitive fiber-optic networks already serve the enterprise market; some of the most rapidly growing CLECs, at present, are those engaged in extending and consolidating local fiber optic networks. *See* Table 10.[33]

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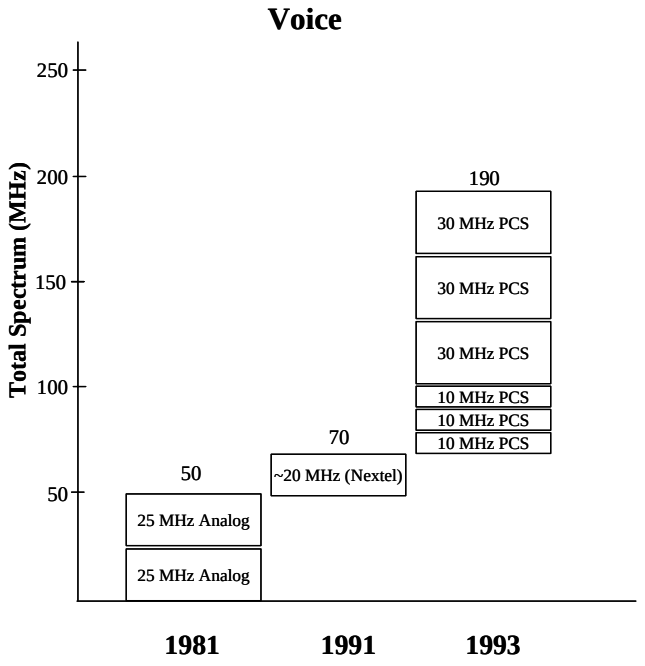
[30] *See* DSL Forum Report, *Highlights of the International Telecommunications Union – Telecommunications Study Group 15 Question 4 Meeting in Geneva, October 15-16, 2001*, http://www.dsllife.com/newsletter/ITU_highlights.html ("ADSL/HDSL uses approximately 1 MHz of the copper wire spectrum.").

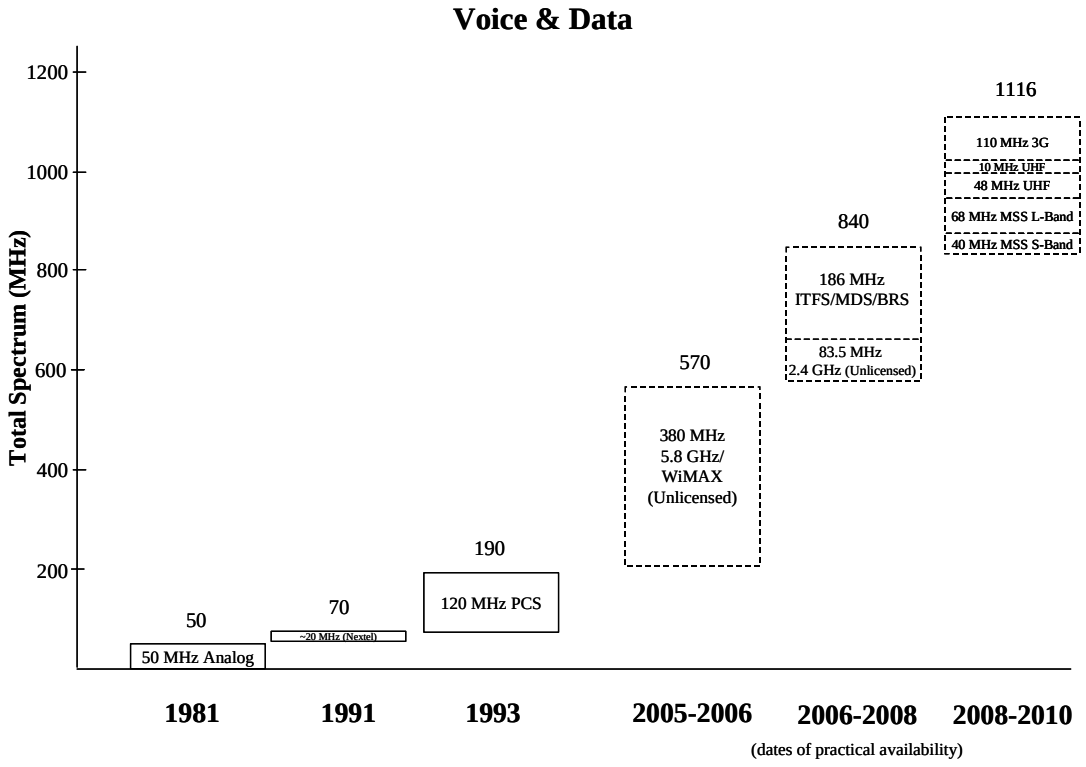
[31] *See, e.g.*, M. Singer, *S.F. Takes 'Broadband Wired City' Crown*, Internetnews.com (May 6, 2003), http://www.internetnews.com/infra/article.php/2202321 (reporting that broadband users spend "approximately 23 hours a week online"); J. Horrigan & L. Rainie, Pew Internet & American Life Project, *The Broadband Difference* at 13 (June 23, 2002) (reporting that broadband users are online an average of 95 minutes a day); Ind. Anal. & Tech. Div., WCB, FCC, *Trends in Telephone Services* at Table 10.2 (Aug. 2003) (reporting that average line usage per day per local loop in 2001 was 71 minutes) (in total, broadband users spend between 48 and 92 hours online per month as compared to voice lines which are used, on average, for 36 hours per month (assumes 30 days or 4 weeks in a month)).

[32] *See* Appendix A § II.

[33] *See generally Balhoff/Legg Mason Testimony* at 4 (Facilities-based CLECs "have entered a financially attractive market to target those customers that could generate reasonable profits in high-density regions. The result is that businesses now have a variety of asset-based competitors from which to choose.").

Figure 3. Spectrum Evolution





In response, Bell companies have invested very heavily in their deregulated wireless affiliates, most recently to deploy broadband capabilities.[34] The Bell companies have likewise begun deploying fiber to the curb, neighborhood, or premises to replace their legacy wireline facilities.[35] Absent regulation, ILECs would have every incentive to deploy these more efficient, broadband networks as quickly as possible. Analysts agree that such a strategy addresses both the competitive threat from cable competitors and the on-going need to replace aging plant.[36] UNE regulation, however, depresses the price of legacy services, encourages customers to remain on the old network, and thus makes it more difficult to migrate customers on to the new broadband pipe. At the same time, unbundling rules suppress cash flow at a time when it is most needed to respond to meet the new intermodal competition with new facilities and services.[37]

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[34] Cingular and Verizon Wireless had combined capital expenditures of $8.4 billion and $8.0 billion in 2002 and 2003, respectively. *See* Skyline Marketing Group, *CapEx Report: 2003 Annual Report* at 45 (Apr. 2004); Skyline Marketing Group, *CapEx Report: 2002 Annual Report* at 35 (June 2003). The proportion of RBOC capital investment dedicated to growth services (like wireless broadband) has increased since 2003. *See, e.g.*, R. Grubbs & M. French, Kaufman Bros., *Verizon Communications: Repeal of FCC UNE Rules Imminent – CLECs May Leave Some Markets: Raising to Buy* at 1 (June 14, 2004); J. Hodulik, *et al.*, UBS, *Moving Ahead with Broadband* at 1 (Jan. 9, 2004) ("Verizon will spend an incremental $1B on EV-DO buildout in two years.").

[35] *See* Verizon News Release, *Verizon Poised to Deliver First Set of Services to Customers Over Its Fiber-to-the-Premises Network* (July 19, 2004); SBC News Release, *SBC Communications Announces Advances in Initiative to Develop IP-Based Residential Network for Integrated Video, Internet, VoIP Services* (June 22, 2004); N. Gupta & I. Chung, Citigroup, *Stocks Appear to Be Pricing LT Risk of RBOC Entry into Video* at 14 (June 29, 2004) ("BellSouth has . . . about 1 million homes passed with Fiber to the Curb (FTTC), growing at about 200,000-300,000 homes per year.").

[36] *See, e.g.*, N. Gupta & I. Chung, Citigroup, *Stocks Appear To Be Pricing LT Risk of RBOC Entry into Video*, at 4 (June 29, 2004) ("We believe the Bells commitment to deploy fiber deeper into their networks is in response to the competitive threat posed by cable entry into the telephony business"); Bernstein Research & Telcordia Technologies, *Fiber: Revolutionizing the Bells' Telecom Networks* at i (May 2004) ("With competition poised to re-intensify in their core wireline businesses, the Bells are facing a degree of earnings stagnation over the next five years never before experienced in their 20-year histories; short of adopting a harvest strategy, the only other reasonable approach appears to be a revolution in network design and business management. We believe that fiber-to-the-premise (or FTTP, for short) can lead to this kind of transformation."); J. Halpern, Bernstein Research, *Evolution vs. Revolution II: A Call to Action for the Bells* at 1, 7 (June 2, 2004) ("The highly competitive arena in which the RBOCs must operate over the next half decade (and beyond) demands a dramatic reduction in wireline operating expenses – on the order of 10-15% – to halt and then reverse the earnings compression seen over the past few years. . . . The development of new, fiber-based access networks provides an opportunity for a revolutionary shift in the RBOCs' operating model.").

[37] *See, e.g.*, J. Bazinet, *et al.*, JP Morgan, *The Art of War* at 3 (Nov. 7, 2003) ("[I]nvestors must now contend with a bit of a double whammy: heightened inter-modal competition from cable and wireless – courtesy of Adam Smith's invisible hand – coupled with intensified intra-modal competition from IXCs and CLECs, courtesy of the Feds."); *Balhoff/Legg Mason Testimony* at 5 ("[W]e may have a system that is draining cash flows from viable competitors – the LECs – precisely at the moment when they need to invest in order to withstand the next stages of formidable intermodal competitive activity from attractive wireless and cable-based services.").

Table 10. All Types of Competitive Carriers Are Prospering	
Voice-over-IP Providers	
Vonage	Completed Series D funding round in August 2004, bringing total outside investment to $208 million; "We have consistently doubled our customer-base every six months and expect to exceed year end estimates by a wide margin." (7/04)
Net2Phone	"The results of this quarter demonstrate that we are successfully continuing on the path we had mapped out two years ago." (3/04); Third quarter of fiscal 2004 was the "12th consecutive quarter of 40%+ gross margins." (6/04)
Wireline CLECs	
AT&T	"AT&T is gaining share in the more lucrative local business voice market." (1/04)
Cablevision Lightpath	"For the second quarter, Lightpath reported $49.8 million in net revenues, a 9% increase compared to the prior year period. This growth was primarily attributable to a 47% increase in the number of Business Class Optimum Online customers and a 10% increase in fiber-based transport services." (8/04)
Cavalier	"Cavalier reached a significant financial milestone in the month of June by becoming net income positive, an accomplishment unheard of for CLECs." (8/04)
Cox Business	"Cox Business Services . . . generated $275 million in revenue in 2003" and "has enjoyed high 30% growth rates over the past few years." (5/04) Cox Business Services "generated $83.1 million in revenues during the first quarter of 2004, up a full 25 percent from . . . the year-ago period." (7/04)
Grande Comms.	"Grande reported operating revenue of $45.8 million for the second quarter ending June 30, 2004, an increase of 10% from $41.7 million in the first quarter ending March 31, 2004. Growth in revenue was driven, in part, by continued strong growth in Grande's bundled cable television, telephone and broadband Internet offerings." (8/04)
Integra Telecom	"Integra was free cash flow positive in 2003 generating $121 million in revenues and $28 million in EBITDA." (4/04)
ITC^DeltaCom	"ITC^DeltaCom's success in 2003 is evidenced by the solid growth in our core integrated communications business." (5/04) "We are extremely pleased with the progress ITC^DeltaCom has made during the second quarter . . . We've increased our EBITDA by more than 34.8% over the first six months of 2003." (8/04)
KMC Telecom	"KMC completed its operational restructuring last year, and we have now completed our financial restructuring. As a result, KMC Telecom today is a strong and cash-flow-positive company." (7/03)
Level 3	"We generated $25 million of positive consolidated free cash flow for the last half of 2003." (2/04) "Our market share gains during the second quarter in our service offerings and our initial successes with our new services give me confidence that our competitive advantages are being recognized by our customers and within the industry." (7/04)
MCI	"In the first quarter the Company had positive cash flow of $150 million, taking its cash balance to $6.3 billion." (1Q04); "By executing against our business plan, we produced second quarter results that reflect solid, measurable progress and significant financial improvements." (8/04)
McLeodUSA	"The Company's operations performance in the first quarter continued to meet our high expectations . . . We continue to believe the multiple initiatives we have in place to profitably grow revenues will produce positive results as we proceed through 2004." (1Q04) "In the second quarter, the Company continued to meet or exceed all operational goals achieving 92% customer satisfaction, 99.7% billing accuracy and 99.999% network reliability ratings." (7/04)
Time Warner Telecom	In the second quarter of 2004, Time Warner Telecom "[g]rew enterprise revenue $9.3 million, or 13% year over year . . . Produced EBITDA of $55.2 million and EBITDA margin of 34% . . . Increased the number of buildings served directly by the Company's fiber network by 24%, year over year . . . Grew customers by 20%, year over year." (8/04)
XO	"We are pleased with our achievements in the first half of 2004 . . . Our improvements quarter over quarter in EBITDA and revenue reflect the increased productivity in our business, and our near-term focus will be to complete the integration of the two companies, reduce costs and begin to generate positive cash flow." (8/04)

Table 10. All Types of Competitive Carriers Are Prospering	
Wholesale Fiber Providers	
AboveNet	"AboveNet is a survivor that has blasted out of bankruptcy and is ready to take its place as a formidable player helping to reshape the industry." (9/03)
American Fiber Systems	"Having achieved operating cash flow positive last year and free cash flow positive this quarter, we were able to attract interest for further expansion of our networks on an optical last mile basis into select buildings." (8/03)
Fibertech Networks	Cash positive for all of 2003; expects to show a pre-tax profit for 2004.
Looking Glass Networks	"[T]he company's operating results were Adjusted EBITDA positive, after excluding certain non-cash charges in the first quarter. . . . Looking Glass' first quarter 2004 recurring revenue . . . increased over 60% from the same period in 2003." (1Q04)
Northeast Optic Network (NEON)	"NEON continued solid revenue growth through the first half 2003 and completed the acquisition of Columbia Transcom in September 2003, which provides [an] additional network from New York to Washington, DC."
OnFiber	"Our expansion into new markets such as Phoenix indicates that OnFiber's growth is continuing to accelerate . . . As need and opportunity arise, OnFiber will continue to execute on its strategy to cost effectively serve customers nationwide." (8/04)
Utilities	
AGL Networks	"[W]e are expanding our management team to meet the demand we are currently seeing in the wholesale market, which we expect to continue to grow rapidly." (5/03)
Con Edison Communications	CEC's New York customer base grew by 125 percent in the first half of 2003. CEC's buildings served increased 20 percent over the same period and it installed more circuits in the first half of 2003 than it had in all of 2002.
Progress Telecom	"Progress Telecom is positioned to grow along with its customers – bringing them access to quality services in high demand locations." (2/04)
Fixed Wireless Providers	
airBand	"airBand has achieved profitability in all of its existing markets. The company's proven business approach has also resulted in forty consecutive months of recurring revenue growth. In addition, the availability of its VoIP service is expected to generate significant lift for the model airBand already has in place." (5/04)
First Avenue Networks	"[S]ecured an additional $350 thousand" following the January 2004 announcement of $4 million for "a total of $4.35 million in equity financing." (2/04) Signed a letter of intent to acquire Teligent "in a stock transaction valued at approximately $99 million." (7/04)
NextWeb	"strong organic growth" with "more than 800 enterprise customers." (12/03) Graham Barnes, CEO: "NextWeb and SkyPipeline, more than any other WISPs in the country, have not only proven that this business is extremely viable, but that it also delivers a tremendous product and value advantage to the market. As a single company, we intend to strongly leverage that advantage to become the dominant player in the California business broadband service market, and beyond." (1Q04)
Sources: See Appendix H.	

II. FACILITIES-BASED COMPETITION FOR MASS-MARKET CUSTOMERS

Since the *Triennial Review*, technological and market developments have enabled competing carriers to use packet switches, broadband loops, and wireless networks to provide mass-market voice services that are comparable to conventional circuit-switched service in quality, functionality, and price. More than half of all mass-market customers now use one or more of these intermodal alternatives for at least some of their voice services (*see* § I.A), and a large and rapidly growing number of mass-market consumers have abandoned their traditional wireline service entirely in favor of these alternatives. The notion that voice service could be provided economically to mass-market customers only by combining circuit switches with analog (narrowband) loops,[1] is now obsolete.

Cable companies now offer circuit-switched telephony to about 15 percent of all U.S. households, and among those households, almost 1 in 5 already subscribe. *See* § II.C.1. In markets where the service has been available for several years, penetration is as high as 1 in 3, or 1 in 2. *See id.* Cox reports margins on circuit-switched telephony as high as 45 percent. *See id.*

Far more significantly, however, numerous competitors are now providing low-cost, high-quality voice service to mass-market customers using *packet* – not circuit – switches, and *broadband* – not narrowband – local transport. *See* § II.A.1. These competitors sell voice service not as a bundle of switching and transport, but as a discrete service that runs on top of broadband data connections sold separately, in a competitive market. In price, service quality, and functionality, the new voice services are competitive with the old. *See* § II.A.2. The six major cable operators, who collectively reach 85 percent of U.S. households, have all begun commercial deployment of Voice over Internet Protocol (VoIP) services, or have announced plans to do so imminently. *See* § II.A.1. A significant number of consumers have already abandoned circuit-switched service entirely in favor of VoIP, and the number is rising rapidly. *See* § II.A.1.

Wireless service provides an additional competitive alternative to traditional wireline service. *See* § II.B. Since the time of the *Triennial Review* proceeding, the number of wireless lines has grown from 129 million to 161 million. *See* § II.B.1. The percentage of users giving up their landline phones has grown from 3-5 percent to 7-8 percent. *See id.* Wireless has already displaced nearly 11 million wireline primary access lines, and that number is expected to reach 22 million by 2008. *See id.* Even greater shares of traffic are migrating to wireless networks; wireless now accounts for 29 percent of all voice traffic, up from 16 percent at the time of the *Triennial Review*. *See id.* As these trends indicate, wireless prices are fully competitive with wireline. *See* § II.B.2. The coverage and reliability of wireless networks also has continued to improve, and the overwhelming majority of consumers now view wireless quality as perfectly adequate for voice. *See* § II.B.3.

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[1] *See, e.g.*, *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978, ¶ 459 (2003) ("*Triennial Review Order*") ("The mass market for local services consists primarily of consumers of analog 'plain old telephone service' or 'POTS' that purchase only a limited number of POTS lines and can only economically be served via analog DS0 loops."); *id.* ¶ 439 ("[F]or the typical entrant, entry into the mass market will likely require access to the incumbent's loops, using the UNE-L strategy.").

A. Voice over Packet-Switched Broadband Networks

Since the *Triennial Review*, it has become both feasible and economical for CLECs to provide voice service to any mass-market customer that has access to a broadband connection. *See* Table 1. The main prerequisite for providing VoIP service is the broadband connection itself, which nearly 90 percent of U.S. households can now obtain from a provider *other than* their incumbent local telephone company. *See* Figure 1 & Appendix A.[2] Though initially deployed to serve residential areas, cable networks have now been extended to provide broadband services to many business customers as well, and small businesses now constitute a fast-growing segment of the customer base. *See* Appendix A.[3] Cable operators have committed to a policy of "network neutrality," which ensures that consumers will be able to connect to independent VoIP providers just as easily as they may browse the Internet.[4] Riding on this competitive infrastructure, a wide range of competitive providers are deploying and marketing VoIP services nationwide. *See* § II.A.1. In price, service quality, and functionality, the new voice services are competitive with traditional wireline service. *See* § II.A.2.

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[2] *See* NCTA, *Industry Overview: Statistics & Resources*, http://www.ncta.com/Docs/PageContent.cfm?pageID=86 (95.6 million homes passed by cable modem service as of year-end 2003); J. Halpern, *et al.*, Bernstein Research Call, *Broadband Update: DSL Share Reaches 40% of Net Adds in 4Q . . . Overall Growth Remains Robust* at 7 and Exhibits 1 & 6 (Mar. 10, 2004) (By year-end 2004, 90 percent of U.S. households will have access to broadband over cable).

[3] *See also, e.g.*, S. Pociask, Telenomic Research, LLC, *A Survey of Small Businesses' Telecommunications Use and* Spending (Mar. 2004) (analyzing small businesses according to three different segments (those with 0-4 employees, those with 5-9 employees, and those with revenues less than $200,000), and finding that "for all three segments penetration was higher for cable modem service than for DSL."); Yankee Group, *Cable and DSL Battle for Broadband Dominance* (Feb. 12, 2004) (finding that for small businesses with fewer than 10 employees "cable modem and DSL maintained an equal share" and that "cable operators have been extremely successful in serving businesses with 10 people or less."); K. Burney, In-Stat/MDR, *The Data Nation: Wireline Data Services Spending and Broadband Usage in the US Business Market; Part Three: Small Businesses (5 to 99 Employees)* (Dec. 2003) (As of year-end 2003, 2.1 million small businesses were using cable broadband, compared to 1.4 million small businesses using DSL).

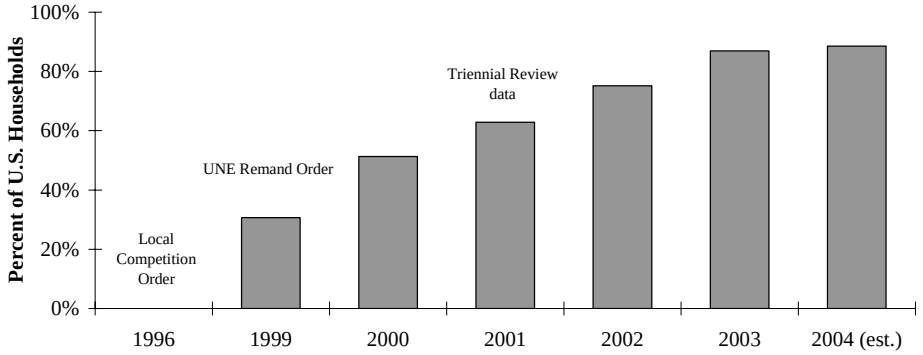
[4] *See* D. Jackson, *NCTA: Cable Won't Get in Vonage's Way*, TelephonyOnline (Dec. 19, 2003) ("Vonage will not be stopped by the cable industry from providing its phone service, even though it competes directly with many cable operators in this emerging market, according to Robert Sachs, president and CEO of the National Cable & Telecommunications Association. This policy is a reflection of the 'network neutrality' philosophy adopted by the cable industry that allows broadband users to access any Web site and use any DOCSIS-approved equipment, Sachs said. . . . For a cable company to strip out voice bits of a Vonage transmission would represent a departure from this philosophy, and the industry has 'no intention' to do that, he said."); *see also* AT&T News Release, *AT&T To Offer AT&T CallVantage Service with Adelphia High-Speed Internet Access* (Sept. 1, 2004) (announcing an agreement under which "Adelphia will now serve as AT&T's preferred broadband solution for customers wishing to sign up for AT&T CallVantage Service in areas served by Adelphia.").

Table 1. VoIP, Then and Now

	Then	Now
AT&T	"VoIP is not ready for prime time." "[N]o reason to believe [VoIP] . . . will act as true substitutes for the ILECs' wireline service any time soon."	"VoIP is now ready for prime time" "Works like your home phone – only better."
Comcast	"I'm traditionally against [VoIP] as a strategy."	"We can now say, beyond the shadow of a doubt, that IP, the IP phone business, should have very attractive economics and could be a very large business for us."
Cox	"VoIP is not yet viable for widespread deployment of residential, primary-line, lifeline phone service." "[T]he company disagrees with what it believes to be overstated, potentially misleading cost comparisons of VoIP vs. circuit-switched technologies."	"Keen interest in rolling out VoIP to all our homes passed" "Expected CapEx Per Customer" is 44% lower for VoIP than circuit-switched cable telephony ($330 vs. $590)
Time Warner Cable	"[P]lans to continue with its [second line] approach . . . because backup powering remains expensive, especially for ubiquitous coverage."	Time Warner's Digital Phone is "Whole-House Primary Line Service," and with power is "over 50% cheaper than traditional circuit switched architecture"
Z-Tel	Facilities-based mass-market competition is "uneconomic, inefficient, commercially impracticable, and, in most cases, technically infeasible"	Z-Tel is "moving to VoIP from UNE-P."

Sources: See Appendix H.

Figure 1. Cable Broadband Availability



Sources: See Appendix H.

1. Competitive Availability, Usage, and Growth

Cable operators, traditional CLECs and interexchange carriers, and a new breed of IP-only providers are now offering VoIP services to mass-market customers throughout the country. *See* Table 2. A large and rapidly growing number of consumers are already purchasing VoIP services, and most of these consumers are buying the service as a replacement for their primary phone line. Although VoIP services are still at an early stage of development, growth rates now rival those witnessed in the boom years of the Internet in the mid-1990s; no static market-share analysis can capture the true competitive impact of this new technology or the speed at which it is taking hold.[5] Industry analysts unanimously agree that a large number of primary access lines – and an even greater amount of traffic – will migrate to VoIP in the relatively near future.

Most importantly, VoIP is promoting adoption of broadband service itself. Indeed, VoIP is now widely viewed as the "killer app" for broadband service.[6] Because VoIP will give consumers an increased incentive to subscribe to broadband service, it will expand the base of broadband customers, and thereby lower the average cost of providing broadband service. Consumers will switch to VoIP at an even faster rate when regulators stop diverting competition to UNE-based alternatives defined by artificially depressed TELRIC prices.[7] UNE-P carriers themselves have now reached the same conclusion.[8]

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[5] *See, e.g.*, *Amendment of Parts 2 and 25 of the Commission's Rules To Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, First Report and Order and Further Notice of Proposed Rule Making, 16 FCC Rcd 4096, ¶ 298 (2000) (DBS market share "may understate their competitive importance" given the "fast growth of DBS"); *Price Cap Performance Review for Local Exchange Carriers*, Second Further Notice of Proposed Rulemaking in CC Docket No. 94-1, Further Notice of Proposed Rulemaking in CC Docket No. 93-124, and Second Further Notice of Proposed Rulemaking in CC Docket No. 93-197, 11 FCC Rcd 858, ¶ 143 (1995) ("[A]n analysis of the level of competition for LEC services based solely on a LEC's market share at a given point in time would be too static and one-dimensional."); *Petition of the People of the State of California and the Public Utilities Commission of the State of California To Retain Regulatory Authority over Intrastate Cellular Service Rates*, Report and Order, 10 FCC Rcd 7486, ¶ 103 (1995) (rejecting CPUC's static analysis of wireless market because it did "not fairly reflect the speed at which CMRS market structure conditions affecting cellular services are evolving"); *Revisions to Price Cap Rules for AT&T Corp.*, Report and Order, 10 FCC Rcd 3009, ¶ 19 (1995) ("Relying solely on AT&T's market share at a given point in time to [analyze competition] would be too static and one dimensional.").

[6] *See, e.g.*, *Creation of Online Regulatory Distinctions in VoIP said to Concern AT&T*, Comm. Daily (Feb. 12, 2004) (David Dorman, CEO, AT&T: VoIP is "a killer application for broadband . . .and will be the biggest driver of broadband adoption in the next couple of years.").

[7] *See, e.g.*, UBS Conference Call with Cox Executives (July 26, 2004) (David Pugliese, VP of Marketing, Cox: elimination of AT&T UNE-P "should result in Cox actually receiving a greater share of the pie"); G. Miller, *et al.*, Fulcrum Global Partners, *Wireline Communications: Revising BLS and SBC Estimates Due to AWE Dilution* at 2, 7 (Mar. 10, 2004) ("In densely populated UNE-P areas," "it simply may not make sense for a cable company to aggressively rollout a telephony-like offering . . . Eliminating UNE-P resale all together . . . would offer incentives to cable companies to pursue such a customer base.").

[8] *See, e.g.*, AT&T News Release, *ATT Announces Second-Quarter 2004 Earnings* (July 22, 2004) (announcing plans to stop providing UNE-P service and instead focus on serving customers through VoIP); Z-Tel Technologies, Inc., *Form 8-K* (SEC filed July 27, 2004) (same).

Table 2. Deployment and Availability of VoIP Services		
	Mass-Market Service Area	**Deployment Status**
Cable Operators		
Cablevision	4.4 million homes passed	Commercial VoIP service available throughout service area 115,000 VoIP subscribers; adding 3,400 customers per week
Time Warner	19.0 million homes passed	Commercial VoIP service available in 30 of 31 markets; adding 1,200 customers per day 40% VoIP penetration among cable modem subscribers in Portland; over 20,000 customers in Raleigh since Jan. 2004 launch
Cox	10.4 million homes passed	Commercial VoIP service available in Roanoke, VA "Keen interest in rolling out VoIP to all our homes passed;" "plan[s] to launch three to four more [VoIP] markets this year"
Charter	12.0 million homes passed	Commercial service in WI and MO; plans to launch in MA in 4Q04 Plans to expand from 120,000 homes passed at the end of 1Q04 to over 1 million by YE
Comcast	40.3 million homes passed	Expanding trial launches in three markets in 2004 (suburban Philadelphia; Indianapolis; and Springfield, MA) Will make half of all homes "VoIP-ready" by 2004; 95% by 2005
Adelphia	9.7 million homes passed	Trials planned for 2004; commercial launch planned for 2005
Bright House	3.6 million homes passed	Commercial launch in Tampa in Aug. 2004
Mediacom	2.8 million homes passed	Commercial launch planned for 1H05
Insight	2.3 million homes passed	Commercial launch in one market planned for the end of 2004, "and then we'll be pretty aggressive about it next year"
RCN	1.4 million homes passed	Commercial launch in Chicago in Aug. 2004, with 1,000 subscribers by the end of the first month, and adding 30 new customers a day
Traditional CLECs and IXCs		
AT&T	46 states (UNE-P)	Commercial service with local numbers available in more than "121 major markets," covering 62 percent of U.S. households in 39 states & DC as of Sept. 2004
Covad	44 states	Commercial launch in 46 markets in 3Q04, including Houston, Las Vegas, Miami, and Portland; "VoIP will be available in all 113 major [MSAs] served by Covad's nationwide broadband network by the end of 2004" Acquired GoBeam with commercial service in CA and Chicago
McLeodUSA	25 states	Began market trial in Chicago, Denver, Dallas, and Detroit in July 2004; general availability in these markets planned for 4Q04, with VoIP expansion into major markets across 25 states expected in early 2005
Z-Tel	49 states (UNE-P)	Beta-testing to business customers launched in May 2004; residential offering expected in certain markets in 4Q04
Cavalier (Phonom)	5 states	Commercial service since Jan. 2004; local numbers available in VA, MD, DE, eastern PA, and southern NJ
Cbeyond	GA, TX, CO	Commercial service in Atlanta, Dallas-Ft. Worth, Denver, Houston
CloseCall	Nationwide	Commercial service since June 2004; local numbers available in 92 area codes in 24 states, as well as 8 additional countries
FDN Comm. (Broadline)	FL, GA	Commercial service since Nov. 2003; consumer figures "are already exceeding business-plan expectations"
New VoIP-Based Providers		
Vonage	Nationwide	Commercial service since Mar. 2002; local numbers available in more than 1,900 active rate centers in 125 U.S. markets
VoicePulse	Nationwide	Commercial service since Apr. 2003; local numbers available in 160 area codes in 28 states & DC
Packet8	Nationwide	Commercial service since Nov. 2002; local numbers available in more than 1,900 rate centers in 46 states & DC
Net2Phone	Nationwide	Commercial service since June 2001; local numbers available in 22 area codes in 9 states

Table 2. Deployment and Availability of VoIP Services		
	Mass-Market Service Area	**Deployment Status**
Addaline	Nationwide	Commercial service with local numbers available in 36 area codes in 13 states & DC
BroadVoice	Nationwide	Commercial service since Apr. 2004; local numbers available in more than 1,300 active rate centers in 28 states & DC
Broadvox Direct	Nationwide	Commercial service since Mar. 2004; local numbers available in 176 area codes in 22 states & DC
DigiLinea	Nationwide	Commercial service since May 2004; local numbers available in 32 states & DC
eGlobalPhone	Nationwide	Commercial service since Aug. 2004; local numbers available in 12 area codes in 10 states; plans service in 200 markets by YE 2004
FuturaVoice	Nationwide	Commercial service with local numbers available in 132 area codes in 24 states & DC; availability in all states planned for 2004
gee-fon	Nationwide	Local numbers available in 17 states & DC
iConnectHere	Nationwide	Commercial service since Aug. 2002; local numbers available in 53 area codes in 18 states & DC
Lingo	Nationwide	Commercial service since June 2004; local numbers available in 220 area codes in 46 states & DC
MagicPhone	Nationwide	Commercial service since May 2004; area code 646, with other area codes available for $1.99/month
Rubicon IPNet	Nationwide	Commercial service (local area codes available for $1.50/month)
Voip.net	Nationwide	Commercial service with local numbers available in 22 states & DC
ZipGlobal	Nationwide	Commercial service since Mar. 2004; local numbers available in more than 100 area codes in 25 states & DC
Sources: See Appendix H.		

Cable Operators. Since the beginning of 2004, each of the six major cable operators – whose networks reach 85 percent of U.S. households and serve 90 percent of all cable modem subscribers – has either begun commercial deployment of IP telephony service, or has announced plans to do so imminently. *See* Table 2.[9] Many smaller cable operators have done so as well. *See* Table 2.

Analysts now predict that all major cable operators will offer cable telephony "to nearly 100% of their in-franchise homes over the next two to three years."[10] The smaller cable operators are expected to offer cable telephony to about two-thirds of their subscribers within

[9] *See also* J. Halpern, *et al.*, Bernstein Research Call, *US Telecom & Cable: Faster Roll-Out of Cable Telephony Means More Risk to RBOCs; Faster Growth for Cable* at 2 (Dec. 17, 2003) ("*Bernstein Cable Telephony Report*") ("Nearly every major cable MSO has indicated over the past month that it will offer cable telephony service to every or nearly every household in its footprint by 2005, with Time Warner Cable and Cablevision targeting year-end 2004"); J. Hodulik, *et al.*, UBS, *High-Speed Data Update for 3Q03: Competition Heats Up in Broadband* at 12 (Dec. 1, 2003) ("By the end of 2005/2006" four major "cable operators will have rolled out a cable telephony service across substantially all of their respective footprints, representing total homes of approximately 70 million."). The assets of Adelphia, the fifth-largest MSO, were up for auction as of late September 2004, with final bids due by the end of the year. Potential buyers include Time Warner, Cox, and Comcast, all three of which have made large strides in VoIP deployment. *See* Adelphia Press Release, *Bankruptcy Court Approves Adelphia Sale Advisors* (Sept. 14, 2004); F. Williams, *Adelphia Plans To Sell Itself Whole or in Pieces*, Buffalo News (Aug. 7, 2004).

[10] *Bernstein Cable Telephony Report* at 1.

that same time frame.[11] Analysts estimate that, within two years, 80 percent or more of U.S. households will be able to obtain IP telephony services from their cable operator.[12]

Cablevision was the first cable operator to deploy IP-based telephone service throughout its cable service territory. The company now offers VoIP to all 4.4 million cable homes that it passes in metropolitan New York, southern Connecticut, and New Jersey.[13] Time Warner has deployed IP telephony in 30 of its markets, and is "on track to be fully launched in all divisions" – which pass a total of 19 million homes – "by year-end 2004."[14] Comcast offers circuit-switched voice service to approximately 9.8 million homes, and executives have stated that the company plans to upgrade half of the 40 million homes passed to provide VoIP service by the end of 2004, and 95 percent of homes passed by the end of 2005.[15] Cox already offers circuit-switched voice service to more than half of the 10 million homes it passes, and has begun offering VoIP service in one of its other markets – Roanoke, Va. – with plans to offer VoIP service in up to four additional markets later this year.[16] Charter plans to offer VoIP services in 2004 to at least one million of the 12 million homes it passes.[17]

Analysts project that cable operators will capture 10 percent of current residential lines by 2007,[18] and over 15 percent by 2008.[19] *See* Table 3. These projections may well prove to be

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[11] *See Bernstein Cable Telephony Report* at 4-5.

[12] *See, e.g.*, *Bernstein Cable Telephony Report* at 4 (estimating that cable operators will deploy VoIP to "roughly 82% of US households" by 2006); Kagan, *Cable VoIP Outlook: Q1 '04 Sector Update* at 17 (Jan. 2004) ("*Kagan 1Q04 Cable VoIP Outlook*") (estimating that cable VoIP will pass 80 percent of occupied households in 2006).

[13] *See* Cablevision News Release, *Cablevision Completes Network Rebuild* (Dec. 3, 2003).

[14] Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference at 3, 20 (Sept. 28, 2004).

[15] Financial Tables *attached to* Comcast Press Release, *Comcast Reports Second Quarter 2004 Results* (July 28, 2004); *Comcast Corporation Shareholders Meeting – Final*, FD (Fair Disclosure) Wire, Transcript 052604az.779 (May 26, 2004); Comcast Presentation at the Merrill Lynch Telecommunications, Media & Technology Conference at 16 (June 10, 2004), http://media.corporate-ir.net/media_files/irol/11/118591/presentations/061004.pdf.

[16] Cox News Release, *Cox Communications Brings Digital Telephone Service to Northern Virginia; Northern Virginia Marks Cox's 13th Telephone Market* (Apr. 30, 2004); Cox News Release, *Cox Communications Delivers Cox Digital Telephone to 12th Market; Roanoke, Va. Marks Cox's First Market Launch of VoIP Technology* (Dec. 15, 2003); *Q2 2004 Cox Communications Inc. Earnings Conference Call – Final*, FD (Fair Disclosure) Wire, Transcript 072904av.745 (July 29, 2004). *See also* C. Larsen, *et al.*, Prudential Equity Group, LLC, *Telecom Services: We Believe Cox Is Poised To Announce New Markets for VoIP and That All Future Telephony Launches Will Be IP-Based* at 1 (Sept. 14, 2004).

[17] Mark Barber, VP of Corporate Telephony, Charter Communications, *Charter Voice-Over-IP Current Status and Future Plans*, presentation at the Banc of America Securities Voice over IP Conference at 4 (Apr. 14, 2004), http://media.corporate-ir.net/media_files/NSD/CHTR/presentations/chtr_041404.pdf; G. Campbell, *et al.*, Merrill Lynch, *Everything over IP: VoIP and Beyond* at 17, 52 (Mar. 12, 2004) ("*Merrill Lynch, Everything over IP*").

[18] *See, e.g.*, F. Governali, *et al.*, Goldman Sachs, *Cable Telephony/VoIP Threat Evolves, But Shouldn't Be Catastrophic* at 1 (Apr. 16, 2004) ("*Goldman Sachs Cable Telephony/VoIP Analysis*").

[19] *See, e.g.*, *Bernstein Cable Telephony Report* at 1 ("[W]e are raising our estimate of cable telephony subscribers from 10.4M by 2008 (off a 2003 base of 2.3 M) to 17.4 M. Our new outlook suggests that the cable

conservative. Consumer surveys report very high interest in VoIP. In a recent Gallup Poll, "[r]oughly 34% of respondents that do not have VoIP [said they] would switch from their existing landline service to VoIP for cost savings."[20] As of mid-August 2004, Time Warner was signing up 1,200 VoIP customers per day.[21] Some 40 percent of Time Warner's cable modem customers in Portland – 14 percent of all homes in the city with access to voice – are now purchasing Time Warner's VoIP service.[22] In Raleigh, Time Warner has acquired 20,000 customers since its January 2004 launch.[23] In Roanoke, Cox Cable's first VoIP market, Cox reports penetration ramping up as quickly as in markets where Cox offers circuit-switched service – markets in which Cox's penetration now averages 20 percent and rises as high as 55 percent.[24] Cablevision has been adding VoIP subscribers at a rate of 3,400 per week in the New York metropolitan area.[25]

MSOs will control 15.5% of the consumer primary access lines in the US by 2008, up from our previous estimate of 9.3%); *see also* F. Governali, *et al.*, Goldman Sachs, *Telecom Services: Qualifying the VoIP Threat, an Eye-Opening Exercise* at 1 (Dec. 23, 2003) ("[W]e've been expecting the Bells to lose 20% to 30% consumer market voice share, as a result of the aggressive introduction of voice services by the cable industry over the next 5 to 7 years.").

[20] J. Hodulik, *et al.*, UBS, *Gallup Survey Highlights VoIP Potential* at 1 (Apr. 8, 2004); *see also* Michael K. Powell, Chairman, FCC, remarks at the National Association of Regulatory Commissioners General Assembly, Washington, DC (Mar. 10, 2004) (50 percent of Internet households are interested in switching to VoIP service); AT&T Customer Insights Group, *VoIP PR Research: Public Opinion on VoIP* at 12 (Jan. 2004) ("three out of four adults have heard of [VoIP] technology," and "[a]mong current 'non users' aware of VoIP services, 76 percent would consider actually implementing the service in the next year, depending on the price and package offering." Of that 76 percent of respondents, 63 percent would consider VoIP to replace a primary line); J. Barrett, *et al.*, Parks Associates, *Residential Voice-over-IP: Analysis & Forecasts* at Figure 5-20 (Jan. 2004) ("*Parks Associates Residential VoIP Analysis*") (53 percent of broadband households interested in VoIP were willing to switch service providers if a single company offered a telephone, TV, and Internet bundle; 77 percent were willing to switch for a monthly savings of $10, and 85 percent were willing to switch for a monthly savings of $20); C. Moffett, *et al.*, Bernstein Research Call, *Cable and Telecom: Bernstein Study Finds Consumers Ready and Willing to Switch to Cable Telephony* (Dec. 9, 2003) ("26% of households . . . report a *preference* for their cable operator over their RBOC for voice telephony service even at no discount to their current rate. 51% of respondents report a preference for a cable telephony service over an equivalent RBOC offering if a 30% discount is offered by the cable operator.").

[21] *See* M. Stump, *Technology's Creative Master*, Multichannel News (Sept. 27, 2004) (quoting Time Warner Cable chief technology officer Mike LaJoie).

[22] *See id.*; Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference at 21 (Sept. 28, 2004).

[23] Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference at 21 (Sept. 28, 2004).

[24] *See* Chris Bowick, SVP Engineering & CTO, Cox Communications, *Cox Communications: Distribution at Its Best*, presentation at the Bear Stearns 17th Annual Media, Entertainment & Information Conference at 19 (Mar. 8, 2004); *Q1 2004 Cox Communications Inc. Earnings Conference Call – Final*, FD (Fair Disclosure) Wire, Transcript 042904as.714 (Apr. 29, 2004) (Pat Esser, Cox executive vice president & COO); M. Richtel, *Time Warner To Use Cable Lines To Add Phone to Internet Service*, N.Y. Times (Dec. 9, 2003) ("In Omaha, 45 percent of Cox's cable customers now subscribe to its telephone service, and in Orange County, Calif., that figure is 55 percent."); C. Moffett, *et al.*, Bernstein Research Call, *Cable and Telecom: Bernstein Study Finds Consumers Ready and Willing To Switch to Cable Telephony* (Dec. 9, 2003) (in Cox's most mature circuit switched markets share is now approaching 35% of homes passed).

[25] *See* A. Bourkoff, *et al.*, UBS, *Cablevision Systems: 2Q04 Results Ahead of Expectations* at Table 6 (Aug. 10, 2004) (net adds per week in 2Q04).

Table 3. Cable Telephony Subscriber Forecasts				
		2004	**2005**	**2006**
Circuit-Switched + VoIP	JP Morgan (Nov. 2003)	3.8 million	6.3 million	8.9 million
	Bernstein (Dec. 2003)	3.7 million	7.0 million	11.7 million
	Morgan Stanley (Jan. 2004)	3.1 million	4.6 million	6.4 million
	Frost & Sullivan (Jan. 2004)	4.2 million	6.1 million	7.7 million
	Merrill Lynch (Mar. 2004)	3.7 million	7.0 million	10.5 million
	UBS (Apr. 2004)	3.1 million	4.4 million	5.8 million
	Citigroup (June 2004)*	2.9 million	4.2 million	6.3 million
	Blaylock (July 2004)	3.2 million	4.8 million	6.8 million
	Buckingham Res. (Aug. 2004)	3.3 million	4.8 million	7.7 million
VoIP Only	JP Morgan (Nov. 2003)	1.0 million	3.0 million	5.3 million
	Kagan (Jan. 2004)	0.4 million	1.9 million	5.6 million
	Yankee Group (June 2004)	1.0 million	2.8 million	7.0 million
	Buckingham Res. (Aug. 2004)	0.1 million	0.9 million	3.1 million

*Citigroup data are limited to estimates for Cablevision, Cox, Comcast, and Time Warner Cable.
Sources: See Appendix H.

Traditional CLECs and Interexchange Carriers. Many traditional CLECs and IXCs have also begun deploying VoIP services, or have announced plans to do so. AT&T's new consumer strategy is to "migrate to [VoIP] and alternate access" so that it can "provide Local & Long Distance & Advanced Applications & Mobility – all on our own platform."[26] In February 2004, AT&T made a "commitment" to deploy mass-market VoIP service in the top 100 MSAs by the end of 2004,[27] and by August announced that it had reached that goal ahead of schedule and was serving "121 major markets" with plans for continued expansion.[28] As of the end of September 2004, AT&T's offering reached 62 percent of U.S. households.[29] AT&T projects it will have one million VoIP subscribers by the end of 2005.[30] AT&T has recently entered into marketing agreements with four major cable operators (Comcast, Time Warner, Cox, and Adelphia) to

[26] John Polumbo, *President and CEO AT&T Consumer, AT&T Consumer Overview: Bending the Trends* at 11 (Feb. 25, 2004); Cathy Martine, SVP Internet Telephony & Consumer Product Management, AT&T, *Voice over IP* at 10 (Feb. 25, 2004).

[27] Cathy Martine, SVP Internet Telephony & Consumer Product Management, AT&T, *Voice over IP* at 27 (Feb. 25, 2004).

[28] *See* AT&T News Release, *AT&T CallVantage Service Expands to 21 New Markets in Seven States in Nationwide Deployment* (Aug. 19, 2004).

[29] AT&T News Release, *AT&T Lowers Price of Its Residential VoIP Service* (Sept. 30, 2004).

[30] *See* AT&T News Release, *AT&T's CallVantage Service Expands To Serve the Western United States* (May 17, 2004).

facilitate the ability of customers without broadband service to sign up simultaneously for broadband and AT&T's VoIP.[31]

Other carriers are doing likewise. Z-Tel has told investors it is "moving to VoIP from UNE-P,"[32] and that it launched VoIP to business customers in May 2004 "on a beta testing basis and expect[s] to have a residential offering available in certain markets by the fourth quarter of 2004."[33] Level 3 launched a wholesale service that provides carriers with all the building blocks needed to provide residential VoIP service; service is currently available in 50 U.S. markets, and will reach over 300 markets by the end of 2004.[34] Net2Phone has announced that it will use Level 3's wholesale service to expand the availability of its VoIP service over cable networks.[35] Skype and 8x8 have signed similar agreements to use the Level 3 network,[36] as has at least one cable operator.[37] Many other CLECs are enthusiastically adopting VoIP technology as well. *See* Table 2.

New IP-Based Providers. Many new companies that do not offer traditional circuit-switched voice service at all have also begun providing VoIP services. *See* Table 2. These new VoIP-based providers all offer service nationwide, and the larger providers now offer local telephone numbers in virtually all the markets they serve. *See* Table 2. Vonage, the largest of the new providers, currently offers local numbers in more than 1,900 rate centers in

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[31] J. Hu, *AT&T Strikes VoIP Deals with Cable*, CNET News.com (Aug. 19, 2004), http://news.com.com/AT%26%2338%3BT+strikes+VoIP+deals+with+cable/2100-7352_3-5316842.html?tag=nl; AT&T News Release, *AT&T To Offer AT&T CallVantage Service with Adelphia High-Speed Internet Access* (Sept. 1, 2004).

[32] Z-Tel Presentation for the Needham & Co. Sixth Annual Growth Conference (Jan. 2004), http://media.corporate-ir.net/media_files/NSD/ZTEL/presentations/0104.pdf; *see also* Z-Tel News Release, *Z-Tel to Launch Voice Over IP Services Delivering Enhanced Voice and Data Bundles to Small and Medium Businesses and Multiple Housing Units* (Feb. 9, 2004) (Z-Tel will "initially focus on the small-to-medium business market and multiple dwelling units (MDUs) such as condominiums, apartment buildings and hotels in Georgia and Florida.").

[33] Z-Tel Technologies Inc., Form 10-Q (SEC filed Aug. 12, 2004). *See also* Z-Tel News Release, *Z-Tel Announces Resignations of Executive Officers, D. Gregory Smith and Charles W. McDonough* (Aug. 15, 2004) (Z-Tel "intend[s] to continue [its] VoIP investments.").

[34] *See* Level 3 Press Release, *Level 3 Launches Residential VoIP Service in More than 50 U.S. Markets* (May 3, 2004) ("Key features of (3)VoIP Enhanced local service include: Local and long distance calling including access to the PSTN; Local phone numbers; Operator assistance; Directory listings and assistance; E911 emergency services; Local number portability.").

[35] *See* Net2Phone Press Release, *Net2Phone Teams with Level 3 To Expand Cable VoIP Offerings* (May 3, 2004). Net2Phone has signed agreements to provide VoIP service for Bresnan Communications, with over 500,000 homes passed in Colorado, Montana, Wyoming, and Utah. *See* Net2Phone Press Release, *Bresnan Communications Selects Net2Phone as Provider for Cable Telephony Deployment* (May 13, 2004).

[36] *See* Level 3 Press Release, *Level 3 Enabling Skype Through New Voice-over-IP Service Agreement* (July 23, 2004); Level 3 Press Release, *8x8 Teams with Level 3 To Enhance Residential VoIP Services* (June 14, 2004).

[37] *See* Level 3 Press Release, *Level 3 To Provide Voice Services to Charter* (Aug. 30, 2004). Lightyear Network Solutions, a CLEC, signed a similar agreement to provide business and residential VoIP service. *See* Level 3 Press Release, *Lightyear Using Level 3 VoIP Solution To Deliver New Suite of Business and Residential Phone Services* (Sept. 1, 2004).

approximately 120 U.S. markets.[38] Vonage already serves at least 275,000 subscribers, and is adding "more than 25,000 lines per month to its network."[39]

VoIP Software and Applications Providers. Additional competition comes from a number of VoIP providers that rely on the public Internet and do not own or operate network facilities of their own. *See* Appendix C (containing a list of these providers and their service offerings). Skype provides software that enables any user with a PC, sound card, microphone, and speakers to place free calls over the public Internet.[40] According to Chairman Powell, "the quality [of Skype's service] is fantastic – and it's free – it's over. The world will change now inevitably."[41] Skype reports that millions of customers have already downloaded its software, and that within its first year of operation users have spent more than 1.2 billion minutes engaged in free calls.[42] Pulver.com allows "members" who register for its Free World Dialup service to place unlimited free calls to other registered members.[43] Pulver provides hardware that members may connect to their regular phones, as well as software that converts a PC into a "soft phone," both of which also may be obtained from multiple suppliers.[44] As of December 2003, Free World Dialup members had placed an estimated 2 million VoIP calls representing over 1 billion minutes of use, and monthly volume continues to grow.[45] Other companies – like Net2Phone and InPhonex – offer similar, unlimited-free-calling soft-phone software, and also offer call termination on the PSTN at rates well below those offered for circuit-switched service and VoIP services over private IP backbones.[46] Net2Phone claims to "route[] millions of minutes daily over data networks."[47] As one analyst has noted, the competition provided by these services simply does not show up at all in the conventional metrics of competition: these Internet-

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[38] *See* Vonage, *About Vonage: Fast Facts*, http://www.vonage.com/corporate/aboutus_fastfacts.php. Vonage plans to spend $5 million in 2004 to expand to 50 states from 37. J. Hodulik, *et al.*, UBS Investment Research, *The Vonage Story: The Who, What, Where, and How* at 9 (Nov. 24, 2003) ("*UBS Vonage Story*").

[39] Vonage Press Release, *John S. Rego CFO Vonage To Deliver Corporate Presentation at the NJTC Growth Company Showcase* (Sept. 30, 2004).

[40] Skype, *What is Skype?*, http://www.skype.com/products/.

[41] D. Roth, *Catch Us If You Can*, Fortune (Feb. 9, 2004).

[42] *See* Skype News Release, *Skype Celebrates 1 Year Anniversary* (Aug. 29, 2004) (Skype CEO and co-founder Niklas Zennström: "Skype has approximately 9.5 million users, consistently more than 500,000 people connected via Skype at a given moment and more than 1.5 million users per day. . . . More than 2 million SkypeOut calls have been initiated.").

[43] *See* Pulver, *About Free World Dialup*, http://www.freeworlddialup.com/content/view/full/895/; *Parks Associates Residential VoIP Analysis* at 4-12.

[44] *See* Free World Dialup, *Internet Phone Calls*, http://www.freeworldialup.com/content/view/full/216/.

[45] *See* NexTone Communications Press Release, *Free World Dialup Powered by NexTone Session Controllers* (Dec. 17, 2003).

[46] *See Parks Associates Residential VoIP Analysis* at 4-9; InPhonex, *Products and Services*, http://www.inphonex.com/products/products.php.

[47] Net2Phone, *About Net2Phone: Company Overview*, http://web.net2phone.com/about/company/.

enabled voice services can "substitute[] for calling occasions, even as they leave measured market share untouched."[48]

2. Price, Service Quality, and Functionality

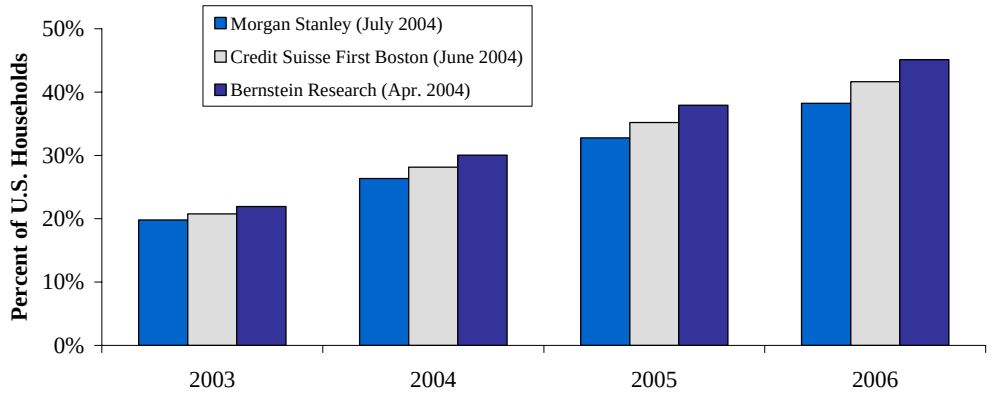
VoIP services are now competitive with those available over traditional circuit-switched networks, and in most cases are cheaper and provide more features and functionality.

a. Economics of Providing VoIP Service

Although VoIP services are in their infancy, they may already be economically provided to the vast majority of mass-market customers, and costs are dropping rapidly. As the following analysis demonstrates, VoIP services can be economically provided not only to customers who already have a broadband connection, but also to those who do not.

VoIP for Existing Broadband Subscribers. Approximately 28 million customers – 25 percent of U.S. households – currently subscribe to broadband service;[49] approximately 30 percent will by the end of 2004, and approximately 40 percent will by the end of 2005. *See* Figure 2. For these households, the *incremental* capital cost of adding VoIP service is low according to the cable companies and VoIP-only service providers who offer VoIP services to these customers.

Figure 2. Residential Broadband Subscribers



Sources: See Appendix H.

The principal incremental equipment-related capital cost of adding VoIP service for a customer who already has a broadband connection is for relatively inexpensive CPE and call-management network equipment.[50] The CPE consists of an analog-to-digital phone adapter and

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[48] J. Halpern, *et al.*, Bernstein Research, *U.S. Telecom and Cable: Flat-Rate Pricing Signals Telephony Voice ARPU Compression* at 4 (Apr. 8, 2004) ("*Bernstein Flat-Rate Pricing Note*").

[49] *See* C. Moffett, *et al.*, Bernstein Research Call, *Broadband Update: Narrower "Availability Gap" Points to RBOC/Cable Share Stabilization* at Exhibit 1 (Aug. 25, 2004). *See also* Appendix A at Table 1.

[50] *See, e.g.*, F. Governali, *et al.*, Goldman Sachs, *VoIP – The Enabler of Real Telecom Competition* at 27 (July 7, 2003) ("*July 2003 Goldman Sachs VoIP Report*") ("No network build is required other than placing

(optionally) a battery for backup power. The adapter encodes the analog signal from an ordinary telephone as Internet-Protocol (IP) digital packets, and dispatches them to the router and modem.[51] Cablevision puts the current incremental cost of the adapter at $23;[52] analysts see costs "dropping rapidly,"[53] and "expect a steep and continued decline . . . as the segment picks up considerable momentum."[54] A backup battery is not needed in any household that can rely on a wireless phone during a power outage, but in any event, a battery can readily be bundled with the adapter, and at least some cable operators plan to do just that.[55] According to Time Warner, battery backup currently costs about $50 per subscriber;[56] that price is projected to drop to $10-$20 within 18-24 months.[57]

Most of the customers currently signing up for VoIP service install the CPE themselves, at no cost to the provider; no major provider sees self-installation as likely to deter customer acceptance of the service.[58] Cablevision estimates that a one-time service call for the (few) customers who do not install CPE themselves costs $66.[59]

VoIP service also requires a "softswitch" or "call management server" in the network to establish, route, and terminate calls, manage call quality, provide vertical services such as caller ID and voice mail, and handle billing. Softswitches are much smaller and less expensive than circuit switches[60] – Cablevision puts the cost at $44 per customer, while Time Warner estimates

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gateways and securing PSTN interconnection in the particular location."); Tom Rutledge, President, Cable & Communications, Cablevision, Cablevision Presentation at the Bear Stearns Media & Entertainment Conference at 46 (Mar. 9, 2004) ("*Rutledge/Cablevision Presentation*").

[51] These devices also are known as an Analog Telephone Adapter (ATA), Multimedia Terminal Adapter (MTA), or Digital Phone Adapter. The adapter can either be a stand-alone device, or its functionality can be incorporated directly in the modem. When built into the modem, it is known as an embedded MTA (E-MTA).

[52] *See Rutledge/Cablevision Presentation* at 46.

[53] G. Campbell, *et al.*, Merrill Lynch, Investext Rpt. No. 7453992, Voice over Broadband – The Challenge from VoIP in the Resident – Industry Report at *30 (June 24, 2003) ("*Merrill Lynch Voice over Broadband Report*").

[54] *Kagan 1Q04 Cable VoIP Outlook* at 5.

[55] *See, e.g.*, Cox Communications, *Whitepaper: Voice over Internet Protocol: Ready for Prime Time* at 13 (May 2004) (Cox provides back-up battery power in Roanoke).

[56] *See* Glenn Britt, Chairman & CEO, Time Warner Cable, Presentation to UBS Media Week Conference at slide 26 (Dec. 11, 2003) ("*Britt/Time Warner Cable Presentation*").

[57] N. Gupta, *et al.*, Citigroup Smith Barney, *Cablevision Systems (CVC)* at 4 (Dec. 12, 2003).

[58] *See, e.g.*, *UBS Vonage Story* at 3 (Vonage "does not require a truck roll to initiate service"); Transcript of AT&T Analyst Day (Feb. 25, 2004) (quoting Cathy Martine) ("[t]here is no truck roll"); D. Iler, *AT&T Paves Last Mile with VoIP*, Multichannel News at 39 (Mar. 1, 2004) (quoting Cathy Martine, SVP of Product Management, AT&T Consumer: installation takes only "about 10 minutes.").

[59] *See Rutledge/Cablevision Presentation* at 46 ("Truck Roll: $66"); *see also* V. Vittore, *Cablevision Gets Cocky*, TelephonyOnline.com (Dec. 12, 2003) ("85% of Cablevision's data customers do self-installation, and the company is planning on moving to that model for voice soon").

[60] *See, e.g.*, *Britt/Time Warner Cable Presentation* at slide 26 ("VoIP is over 50% cheaper than traditional circuit switched architecture."); Chris Bowick, SVP, Engineering and CTO, *Distribution at Its Best: Cox Digital Telephone: The Voice of Experience*, Cox presentation at the Bear Stearns 17th Annual Media, Entertainment & Information Conference at 21 (Mar. 8, 2004) ("Expected CapEx per customer" of $590/sub for circuit switched vs.

$50.[61] Vonage, which uses much cheaper servers,[62] puts its switch costs at just $1 to $2 per customer.[63] The cost of both options is falling steadily.[64] A VoIP provider also pays a one-time fee of about $15 to port a customer's existing telephone number to its switch, or about $1 to obtain a new telephone number.[65]

In sum, the total one-time, equipment-related capital cost for a cable operator to add VoIP service to its existing broadband network is under $200 per customer, and under $150 for customers who don't need a service call or battery backup. The costs for VoIP-only providers like Vonage, which use less expensive equipment, are below $75 per subscriber.[66] If just these equipment-related capital costs are amortized over 36 months,[67] at the current discount rate, these numbers translate into $6 and $4 per month for cable-supplied VoIP, or as little as $2 per month for Vonage-type service.

Subscriber acquisition costs are ordinarily booked as capital expenditures as well. These one-time costs are currently estimated at an average of about $125[68] – or about $3.50 per month

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$330/sub for VoIP); C. Carr, *et al.*, CIBC World Markets, *Comcast Is Best Defense If RBOCs Take the Offensive* at 6, Exhibit 2 (Dec. 5, 2003) (estimating costs per subscriber at $568 for circuit-switched telephony, but $152-$375 for premises-powered VoIP).

[61] *See Rutledge/Cablevision Presentation* at 46 (price per port on soft switch: $44); *Britt/Time Warner Cable Presentation* at slide 26 (softswitch & gateway cost per sub: $50). *See also* M. Paxton, In-Stat/MDR, *Cable Telephony Service: The Third Leg of Cable's 'Triple Play' Bundle* at 21, Figure 7 (Nov. 2003) ("*In-Stat/MDR Cable Triple-Play Report*") (estimating $45 per line for the softswitch).

[62] *See, e.g.*, *Merrill Lynch Voice over Broadband Report* at *47 (Due to Vonage's use of the SIP protocol, "[c]all connections made are effectively on a peer to peer basis (rather than via a softswitch or conventional switch)."); D. Iler, *AT&T Paves Last Mile with VoIP*, Multichannel News at 39 (Mar. 1, 2004) ("the Vonage SIP network does not use a soft switch, like the PacketCable VoIP standard, but relies on servers placed along the network or within customer-premises equipment to perform soft-switch functions.").

[63] *See, e.g.*, *UBS Vonage Story* at 9 ("[Vonage] has 25 regional data centers where its voice gateways, routers, and blade servers reside. The company estimated that its equipment costs per data center run about $100-200K for 100-200K customers.").

[64] *See, e.g.*, *In-Stat/MDR Cable Triple-Play Report* at 35 ("As the bigger telecommunications carriers started to deploy softswitches, they also started to demand that the products function more like Class 5 switches in terms of scalability and functionality, but be less expensive and more capable . . . . To a certain extent, the industry's leading softswitch vendors are meeting these demands.").

[65] *See* Q. Hasan, Utendahl, *Vonage-Telecom Services: VoIP* at 7 (Nov. 4, 2003).

[66] *Cf. Merrill Lynch, Everything over IP* at 16 ("[Vonage] Founder Jeffrey Citron confirmed that our cost estimate of US $50 per new subscriber (excluding marketing expenses) was 'close.'").

[67] *See Merrill Lynch Voice over Broadband Report* at *28, Table 5 (assuming 2.5% churn for VoIP); *see also, e.g.*, D. Barden, *et al.*, Banc of America Securities, *Straight Talk on VoIP* at 2 (Apr. 15, 2004) (Vonage's "churn is about 2.4%"); *UBS Vonage Story* at 7 ("customers that have been with Vonage for six months have a churn rate of 2.1%. This drops to 1.8% for customers that are over one-year old. Over a 2-3 year cycle Vonage expects to see blended churn come down to about 1.5%."); Frost & Sullivan, *North America IP Cable Telephony Market; Is Cable Able?*, Market Insight Report #6917-61 at 7 (Jan. 2004) ("Bundling of services works – offering two services reduces churn from a single service, and offering three reduces churn even further.").

[68] *Merrill Lynch Voice over Broadband Report* at *28, Table 5 (estimating "marketing and installation expenses of between $75 and $125" for cable IP telephony); D. Barden, *et al.*, Banc of America Securities, *Straight Talk on VoIP* at 2 (Apr. 15, 2004) (reporting that Vonage's subscriber acquisition cost is "only $170, and declining"); S. Donohue, *Ops Call on Vonage*, Multichannel News at 42 (Mar. 8, 2004) (Vonage vice president of

when amortized using the same methodology. Factoring in these costs brings the total incremental capital costs up to between $7-$9 per month for cable-supplied VoIP, or as little as $5 per month for Vonage-type service. In other words, based on these providers' own cost estimates, the incremental cost to add VoIP for a customer that already has a broadband connection is on the order of $5-$9 per month.[69]

Current prices and profit margins reflect the low costs of providing VoIP services. VoIP providers are now offering service at considerable discounts from circuit-switched service. As Table 4 demonstrates, VoIP service is typically priced 30-40 percent or more below comparable circuit-switched offerings.[70] In New York, for example, AT&T offers VoIP service for $30 per month, compared to $55 per month for its comparable UNE-P-based offering. *See* Table 4; *see also* Appendix B (describing VoIP offerings in major markets). Moreover, AT&T and other VoIP providers also are now offering significant promotional discounts to attract new subscribers.[71] AT&T recently lowered the price of VoIP service – its second price reduction in four months – from $35 to $30.[72] Vonage lowered the price of its most popular package from $35 to $30 in May 2004,[73] and then again to $25 in reaction to AT&T's price cut in September.[74]

MSO and cable sales Phil Giordano estimates subscriber acquisition costs total about $130 per subscriber); J. Enck, Daiwa Institute of Research, *Eurotelcorama* at 4, 7 (Nov. 3, 2003) ("the estimated cost to build one center (routers, voice gateway and servers, along with associated admin expenses) is under $200,000 per site." Vonage's "average cost of customer acquisition (CAC) has diminished substantially since the service launched in April 2002, and management see the CAC moving down further to a sustainable level of approximately $100 over the next two years."); Q4 2003 Earthlink Conference Call, FD (Fair Disclosure) Wire (Jan. 27, 2004) (Earthlink, which offers VoIP through a partnership with Vonage, announced "blended subscriber acquisition cost in the current quarter was $126 per gross organic subscriber addition.").

[69] *Cf. Cable and Telecom Pinning Their Hopes on VoIP*, Comm. Daily at 5 (Feb. 11, 2004) ("Precursor's Scott Cleland said his analysts calculated that VoIP cost 1/50th the capital expenditures outlays of traditional service."); A. Wahlman, *et al.*, Needham & Company, *The Dumb Pipe Is the Only Money Pipe* at 3 (Dec. 15, 2003) (Costs of voice over broadband "are 1/1000th or less of what it costs the Bells to build their circuit-switched local access infrastructure in the United States."); J. Hodulik, *et al.*, UBS, *First Quarter 2004 Preview: The Calm Before the Storm* at 5 (Apr. 13, 2004) ("IP-based voice infrastructure (servers, routers, softswitches, back-up) costs a fraction of the cost of traditional TDM infrastructure.").

[70] *See generally Bernstein Flat-Rate Pricing Note* at 3 ("By entering with pricing that is 30%+ below prevailing RBOC rates, cable operators are setting benchmarks that will be difficult for incumbent telcos to match.").

[71] *See, e.g.*, AT&T News Release, *AT&T Lowers Price of Its Residential VoIP Service* (Sept. 30, 2004) (AT&T will provide the first month of service free to new subscribers who sign up before January 31, 2005); VoicePulse, *Plans*, http://www.voicepulse.com/plans/default.aspx (VoicePulse offers a savings of more than $70 for the first year with a one-year contract); *This Just In*; *Circuit City Dials Vonage for VoIP Phone Service*, Multichannel News (Mar. 8, 2004) (Circuit City offers customers two months of free service and activation when they purchase starter kits and sign up for Vonage service).

[72] AT&T News Release, *AT&T Lowers Price of Its Residential VoIP Service* (Sept. 30, 2004); AT&T News Release, *AT&T CallVantage Service Expands To Serve 10 Major Markets in Florida* (June 14, 2004).

[73] Vonage Press Release, *Vonage Drops Residential Premium Unlimited Plan by $5 to $29.99* (May 17, 2004).

[74] *See* J. Hyde, *AT&T, Vonage Cut Prices on Internet Calling*, Reuters (Sept. 30, 2004). Vonage also announced that it would upgrade customers subscribing to an existing $25 plan for limited minutes, to an unlimited plan for no extra charge. *Id.*

Even at these low rates, VoIP providers are reporting large profit margins. Cablevision estimates its margins at 40-45 percent, with a capital payback of 10 months.[75] Vonage reports margins of 70 percent, headed to 80 percent.[76] Kagan estimates that cable operators will have cash flow margins of 40 percent for their VoIP services.[77] Wall Street analysts are making similar projections.[78]

[75] *See, e.g.*, *Rutledge/Cablevision Presentation* at 47.

[76] *See* D. Barden, *et al.*, Banc of America Securities, *Straight Talk on VoIP* at 2, 5 (Apr. 15, 2004).

[77] *See Kagan 1Q04 Cable VoIP Outlook* at 9.

[78] *See, e.g.*, *Merrill Lynch, Everything Over IP* at 17 ("We believe that margins on VoIP service could be very high (depending on where pricing and regulation end up) . . . . For cable operators, we believe that incremental service margins on VoIP can be comparable to HSD service margins (i.e., 60%-plus at scale, assuming current pricing) and significantly better than cable TV margins.").

Table 4. VoIP vs. Circuit-Switched Telephony: Comparison of Bundled Local/Long-Distance Service Offerings

	Circuit-Switched			VoIP				Wireless**
	BOC	Cable	UNE-P	AT&T	Vonage	Other*	Cable	
New York, NY	$60 Verizon		$55 AT&T	$30	$25	$20	$35 Cablevision/ $40 Time Warner	$40
Los Angeles, CA	$49 SBC	$49 Comcast	$40 MCI	$30	$25	$20	$40 Time Warner	$40
Houston, TX	$49 SBC		$49 AT&T	$30	$25	$20	$40 Time Warner	$40
San Diego, CA	$49 SBC	$49 Cox	$40 MCI	$30	$25	$20	$40 Time Warner	$40
Tampa, FL	$50 Verizon		$65 Z-Tel	$30	$25	$20	$40 Bright House	$40
Kansas City, MO	$49 SBC		$49 AT&T		$25	$20	$40 Time Warner	$40
San Antonio, TX	$49 SBC		$49 AT&T	$30	$25	$20	$40 Time Warner	$40
Columbus, OH	$49 SBC		$49 AT&T	$30	$25	$20	$40 Time Warner	$40
Milwaukee, WI	$49 SBC		$50 MCI	$30	$25	$20	$40 Time Warner	$40
Charlotte, NC	$55 BellSouth		$55 AT&T	$30	$25	$20	$40 Time Warner	$45 ALLTEL
Bridgeport, CT	$49 SBC		$56 MCI	$30	$25	$20	$35 Cablevision	$40
Raleigh, NC	$55 BellSouth		$55 AT&T	$30	$25	$20	$40 Time Warner	$45 ALLTEL
Syracuse, NY	$60 Verizon		$50 MCI	$30	$25	$20	$40 Time Warner	$40
Portland, ME	$55 Verizon		$55 AT&T			$20 BroadVoice	$40 Time Warner	$40
Roanoke, VA	$50 Verizon		$50 AT&T			$20	$50 Cox	$40

*Packet8, unless otherwise noted. **T-Mobile, unless otherwise noted.

Qwest pricing assumes a maximum expenditure of $20 for long-distance calls. Time Warner pricing assumes subscription to high-speed Internet and digital cable services. Bright House pricing assumes subscription to high-speed Internet and standard cable services.

Sources: *See* Appendix H.

VoIP for Most Mass-Market Customers. For customers who do not already subscribe to broadband service, it is necessary to factor the cost of that service into the analysis. It is also necessary to take into account the fact that the typical U.S. household already purchases, in addition to basic local voice service, some mix of vertical services, long-distance service, second lines, and dial-up Internet access, all of which can be displaced with a VoIP-equipped broadband connection. As demonstrated below, the price for a broadband connection and VoIP service already is comparable to the market price for circuit-switched bundled service offerings.

The average retail price of stand-alone broadband service (*i.e.*, not bundled with another service, but including full Internet access) is approximately $46 per month.[79] For the 67 percent of U.S. households that subscribe to cable video service,[80] the average price is $43.[81] The average price is further lowered by the promotional offerings that broadband providers now routinely offer. *See* Appendix A at Table 4. Credit Suisse First Boston reports that the average user of cable modem service generates only $39 per month of revenue for the cable operator.[82]

According to the most recent data available from the FCC, by contrast, the average household spends $47 per month for local and long-distance services – $37 per month for local, and $10 per month for long distance.[83] This total appears to include contributions for the SLC and Federal Universal Service Fee; the average amount spent on vertical services, second lines, access charges, and intraLATA toll services; and taxes. Consistent with the FCC's reported average, most wireline providers now offer bundles of service for approximately $50-$60 (including the $6 SLC), which include unlimited local and long-distance service plus a number of vertical features. *See* Table 4.

These totals do not, however, include the $22 per month that some 38 million U.S. households[84] (34 percent) pay for dial-up Internet access services.[85] Some part of that is for proprietary content, but the lowest-cost ISP service with unlimited usage still runs about $10 per month.[86]

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[79] *See* J. Atkin, RBC Capital Markets, *Cable/RBOC/DBS: Telephony, Data, and Video Pricing Comparisons*, at Exhibit 2 (Feb. 3, 2004) (estimating $50 for cable broadband and $42 for DSL).

[80] *See* NCTA, *Industry Overview: Statistics & Resources*, http://www.ncta.com/Docs/PageContent.cfm?pageID=86 (73.8 million basic cable customers as of May 2004); J. Halpern, *et al.*, Bernstein Research Call, *Broadband Update: DSL Share Reaches 40% of Net Adds in 4Q . . .Overall Growth Remains Robust* at Exhibit 1 (Mar. 10, 2004) (110.5 million households as of May 2004).

[81] *Merrill Lynch, Everything over IP* at Table 2.

[82] *See* L. Warner, *et al.*, Credit Suisse First Boston, *The Broadband Battle: DSL Prepares To Overtake Cable Net Add Share* at Exhibit 11 (Apr. 20, 2004).

[83] Ind. Anal. & Tech. Div., WCB, FCC, *Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service* at Table 2.6 (July 2004); *see also* A. Quinton, *et al.*, Merrill Lynch, *The Telecommunicator: Telecom Act Seven Years On – The UNE Shock Wave Belatedly Reverberates Around the RBOCs – and How!* at 17 & Table 2 (Sept. 23, 2002) (estimating average expenditures of $12 for InterLATA toll, $2 for intraLATA toll, $2 for access charges, $8.50 for vertical services).

[84] *See* R. Bilotti, *et al.*, Morgan Stanley, *Broadband Update: Bundling Is an Arms Race, Not a Price War* at Exhibit 7 (July 8, 2004) (excluding dial-up subscribers that also use broadband).

[85] *See*, *e.g.*, MSN, EarthLink, and SBC Yahoo! charge $21.95 per month for dial-up service. MSN, *MSN 9 Dial-Up*, http://join.msn.com/?page=dept/dialup&pgmarket=en-us&ST=1&xAPID=1983&DI=1402; Earthlink, *Earthlink Dial-Up Internet Access*, http://www.earthlink.net/home/dial/; SBC Yahoo! Dial, *SBC Yahoo! Dial: Getting Started*, http://promo.sbcglobal.net/sbcyahoo_myhome/. AOL charges $23.90 for dial-up service. AOL, *Price Plans*, http://www.aol.com/price_plans/index.adp. United Online (which includes NetZero, Juno, and BlueLight) charges $9.95, with $14.95 for high-speed dial-up service. United Online, *United Online Home*, http://www.unitedonline.net/.

[86] Netscape, *Netscape FAQ*, http://www.getnetscape.com/more_info.adp?promo=NS_2_11_8_2003_12_1; PeoplePC, *PeoplePC Online Details*, http://www.peoplepc.com/connect/ppc_online.asp; *March 2004 Bernstein Broadband Update* at Exhibit 5.

An analysis based on these current prices establishes that the existing prices for a VoIP equipped broadband connection are comparable to a circuit-switched bundled service offering. *See* Table 5. A broadband connection equipped with VoIP service now sells for between $62 and $90 per month – $42-$50 for the broadband service, plus $20-$40 for VoIP service that includes unlimited local and long-distance services plus vertical features. *See* Table 5.[87] Comparable narrowband voice bundles are priced at between $65 and $95 per month – $55-$73 for the voice component (including the $6 SLC and taxes), *see* Table 5, plus $10-$22 per month for dial-up Internet access.[88] But taxes are considerably higher for narrowband service than for VoIP – a difference of at least $5.45 per month, according to Goldman Sachs.[89] Taking into account these additional charges, the price of VoIP-equipped broadband is comparable to and often lower than the price of conventional service, and in no case more than a few dollars higher, even before taking into account the promotional discounts that are widely offered for both broadband and VoIP service. One study concluded that the average narrowband household could capture a net savings of $8 per month by subscribing to broadband and migrating to VoIP service.[90]

Table 5. Price Comparison of Circuit-Switched and VoIP Service

Service	Circuit-Switched		VoIP		
	BOC	**Cable**	**Cable**	**Vonage**	**Other**
Voice*	$50 - $60	$50	$35 - $40	$25	$20 - $35
Internet Access	$10 - $22		$42	$42 - $50	
Taxes/Fees/Surcharges*	$5.50 - $13+		$0 - $5	$2 - $4	$0 - $5
Total	**$65 - $95**	**$65 - $85**	**$77 - $87**	**$69 - $79**	**$62 - $90**

*Assumes unlimited local, local toll, and long-distance calling. *See* Table 4 & Appendix B.
Sources: See Appendix H.

The foregoing comparison is conservative because it uses the average retail *price* of both VoIP service and the underlying broadband service. As demonstrated above, however, the average incremental costs of providing VoIP service for a cable operator or a VoIP-only provider

[87] *See, e.g.*, AT&T, *CallVantage*, http://www.usa.att.com/callvantage/home.jsp? (AT&T offers consumers that sign up before June 30 a $20 discount each month for the first six months); VoicePulse, *Plans & Pricing: No Hidden Fees*, http://www.voicepulse.com/plans/fees.aspx (VoicePulse offers a savings of $120 for the first year with a one-year contract).

[88] *Cf.* J. Barrett, *et al.*, Parks Associates, *VoIP: At Last a Killer App?* at Figure 2-2 (Jan. 2004) (estimating that average telecommunications expenditure by U.S. household that subscribes to narrowband Internet access is $94 per month).

[89] *See Goldman Sachs Cable Telephony/VoIP Analysis* at 24 (estimating "avoided connection fees for VoIP providers" at $5.45, which includes federal USF contribution, LNP, E911, state telecommunications relay, federal excise tax, and utility user tax); *see UBS Vonage Story* at 3 (voice over broadband providers benefit from having "much lower taxes," whereas "regulatory fees and other taxes [] typically increase the price for the Bells by $10-$15."); Vonage, *Top Questions*, http://www.vonage.com/learn_center.php (Vonage subscribers incur no more than $2.55 to cover the Federal excise tax and regulatory recovery fee; customers in New Jersey are also charged a state sales tax); Optimum Voice, http://www.optimumvoice.com/index.jhtml (Cablevision's VoIP service is priced at "$34.95, all inclusive").

[90] *Parks Associates: VoIP Key to Boosting Broadband Adoption*, Business Wire (Feb. 10, 2004).

are significantly below these current retail prices. An analysis based on these costs, rather than current prices, proves even more conclusively that it is economical to provide VoIP service to most households today. The average household currently spends from $57 to $69 per month on voice and dial-up Internet service together. For most households, this is more than enough to cover the $46 average price of broadband service and recover the cost of providing VoIP service. Moreover, as demonstrated above, the cost of providing VoIP service is dropping quickly.[91]

Finally, VoIP providers already are testing alternative, lower priced plans. For example, in Roanoke, Va., Cox now offers "Basic Line" – barebones, local, VoIP service – for $13.59 per month to non-broadband subscribers; or $12.20 for customers that subscribe to certain video service packages.[92] Time Warner offers its stand-alone "Digital Phone" bundle, which includes unlimited local, in-state and domestic long-distance calls, call waiting, caller ID and call waiting ID for $49.95 per month in 30 markets – fully competitive with comparable bundles offered by UNE-based CLECs.[93] These offerings reflect the fact that *incremental* costs of providing broadband are lower than *average* costs for broadband. With a broad base of multi-service users for whom broadband service is already economical, providers can economically offer VoIP even to households that use the underlying broadband connection for nothing more than voice itself. Broadband connections have already been extended to reach almost everywhere – providers have already concluded they can recover the costs of these ubiquitous networks from the multi-service customers. This enables broadband providers to price broadband transport at marginal cost for those (relatively few) customers who will use the capacity only for barebones voice service.[94]

b. Service Quality and Functionality

Since the *Triennial Review Order*, VoIP services have overcome previous concerns regarding quality and functionality.[95] Industry analysts, competitive carriers, and equipment vendors now uniformly agree that VoIP provides comparable quality and functionality to conventional circuit-switched service. *See* Table 6. And given that VoIP service costs

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[91] *See also* A. Shah, *et al.*, Morgan Stanley, *Voice-over-IP Conference Highlights* at 3 (May 20, 2004) ("Given the very high margins on VoIP, aggressive promotions can be supported without increasing deficits.").

[92] Cox, *Digital Telephone, Roanoke, Pricing*, http://www.cox.com/roanoke/telephone/pricing.asp.

[93] *See, e.g.*, Time Warner Cable, *Plan Details* at http://www.twcdigitalphone.com/newyork/plandetails.htm (New York/New Jersey), http://www.twcdigitalphone.com/maine/plandetails.htm (Maine). *See also* Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference at 19, 20 (Sept. 28, 2004).

[94] As one analyst explains, the Broadband IP Telephony market is not "restricted to the size of the broadband data market" because cable networks are "provisioned a whole neighborhood at a time, not house-by-house," which means that "[p]rovisioning at the neighborhood level means that service is delivered to every house, even if they don't subscribe to the service. The cable company only needs to install an end-user device in the subscriber home and connect it to the network to provide the service. This makes it economical for cable companies to offer PacketCable service to non-data subscribers." D. Schoolar, In-Stat/MDR, *Hear This: Broadband IP Telephony* at 10 (May 2004).

[95] *See IP-Enabled Services*, Notice of Proposed Rulemaking, 19 FCC Rcd 4863, ¶ 11 (2004) ("According to many industry watchers, [VoIP] technology has now overcome prior quality and reliability concerns."); *see also Triennial Review Order* ¶ 229.

considerably less, many consumers would likely substitute VoIP for circuit-switched service even if there were some difference in quality or functionality.[96]

Table 6. Universal Agreement That VoIP Quality Is Comparable to or Better Than PSTN	
VoIP Providers	
AT&T	"Works like your home phone – only better."
Cablevision	"[C]risp, clear digital voice service all the time."
Cox	"[E]xcellent voice quality that meets today's telecommunication standards. . . . crystal-clear connections."
Time Warner	"[Q]uality will be certainly equal to the RBOC quality." "Feels just like conventional telephone service."
Vonage	"98% of our customers experience quality of the call that's equivalent to the quality they get on their POTS service."
Investment Analysts	
Bernstein	"[T]he sound quality for VoIP via cable is likely to be indistinguishable from that of a traditional circuit switched RBOC voice call."
Goldman Sachs	"VoIP on a managed network can reach or even exceed the quality level of the PSTN."
Merrill Lynch	"It now appears possible to deliver high-quality phone service at very low cost via existing broadband connections."
Equipment Suppliers	
Cisco	"[R]eliability, and voice quality of the global switched telephone network."
Nortel	"PSTN-equivalent voice quality and service richness"
Motorola	"[M]eet[s] the reliability and availability demands of primary-line voice applications."
Sources: See Appendix H.	

When the *Triennial Review* was underway in 2002, the standards and protocols for providing high-quality IP telephony had only just been established, and equipment incorporating them was not yet commercially available.[97] Thus, VoIP services, to the limited extent they existed, depended on first-come, first-served switching and routing of packets.[98] When network traffic was heavy, voice packets waited in line along with data; short delays that were of little consequence for e-mail or Web browsing could seriously degrade the quality of a two-way voice

[96] *See, e.g.*, J. Hodulik, *et al.*, UBS, *Gallup Survey Highlights VoIP Potential* at 1 (Apr. 8, 2004) ("Roughly 34% of respondents that do not have VoIP would switch from their existing landline service to VoIP for cost savings. Respondents appear more willing to sacrifice quality than reliability."); J. Halpern, *et al.*, Bernstein Research Call, *SBC & BLS: Cutting Estimates on Cingular-AWE Deal Dilution* at 6 (Feb. 25, 2004) ("Our previous research has shown that consumers exhibit a high willingness to switch telephony providers, even with a sacrifice in quality, provided they are offered a significant discount.").

[97] *See, e.g.*, J. Shim & R. Read, Credit Lyonnais Securities, *The U.S Cable Industry – Act I* at 195 (Nov. 20, 2002) ("Two testing waves of CableLab's PacketCable have not yet produced certified devices. . . . Call-management servers and softswitches are only now beginning to surface in product form."); *id.* at 184 ("Until a fully PacketCable-compliant network is achievable, Comcast will continue to look at VoIP in the access network as it did in Detroit."); *id.* at 185 ("Insight believes that VoIP is still some time away from being commercially deployable as a primary service and will wait for DOCSIS 1.1 and PacketCable to be better defined and tested.").

[98] *See, e.g.*, P. Hunter, *Companies Must Be Prepared for Voice over IP*, Computer Weekly at 48 (Sept. 19, 2002) ("at present it is impossible to guarantee quality when there is no control over the whole of the end-to-end transmission path. For this there needs to be a protocol for signalling and negotiating quality of service between successive networks along an end-to-end path"); M. Branaugh, *With Internet Phone Calls Catching On, Colorado Firms Build Strategies*, Daily Camera (Sept. 2, 2004) ("Early attempts with Internet phone calls by various companies enjoyed limited success. . . . The problem was that the public Internet didn't place a priority on voice transmissions over data ones, so the digital packets from a call could easily get jumbled.").

conversation.[99] Most of these early services also required customers to make their voice-over-Internet phone calls through microphones and speakers connected to their computers, or to deploy cumbersome CPE.[100]

It was not until the very end of 2002 that vendors began manufacturing equipment that incorporated quality-of-service (QoS) standards and protocols, and other functionality to place VoIP on a par with traditional telephone service. *See* Figure 3.[101] The first analog-to-digital adapters built to the PacketCable standard that most cable operators now implement were certified in December 2002;[102] the first PacketCable call management servers were certified in April 2003; and the first compliant IP-to-PSTN gateways in July 2003.[103] The first analog-to-digital adapters that rely on the Session Initiation Protocol (SIP) and other industry standards[104] as alternatives to PacketCable – were first introduced in March 2002.[105] More sophisticated models that further improved service quality were not introduced until December 2003.[106]

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[99] *See, e.g.*, K. Percy, *et al.*, *Tips from the Trenches on VoIP*, Network World at 48 (Jan. 27, 2003) ("Real-time voice traffic will be affected by any bottleneck on the network. A delay of 1 second in retrieving a data file from a server because of congestion might be barely noticeable to the user, but add just 50 millisec of delay on a phone call and it's the difference between high-quality and very poor-quality voice communications.").

[100] *See, e.g.*, *Federal-State Joint Board on Universal Service*, Report to Congress, 13 FCC Rcd 11501, ¶¶ 83-90 (1998).

[101] Cable Datacom News, *Cable IP Telephony Primer* (Jan. 15, 2003); *see also* Motorola, *Using PacketCable QoS To Deliver Carrier-Class Telephony Services* at 4 (Nov. 11, 2003) ("Platforms that are graded as PacketCable 1.0 qualified by CableLabs technical staff have passed rigid interoperability and certification testing, and they allow operators to build telephony infrastructure that enables end-to-end QoS control.").

[102] *See* CableLabs Press Release, *PacketCable Marks Cable Milestone with Certification of First VoIP Devices* (Dec. 20, 2002); *see also* J. Moynihan, *et al.*, Merrill Lynch, *Voice Over Broadband: The Challenge from VoIP in the Residential Phone Market* at 2 (The cable industry "reached a key milestone in December 2002 with CableLabs' certification of hardware under the PacketCable1.0 standard."); *In-Stat/MDR Cable Triple-Play Report* at 1 ("This past year has seen an important maturation of the PacketCable standard for VoIP cable telephony services.").

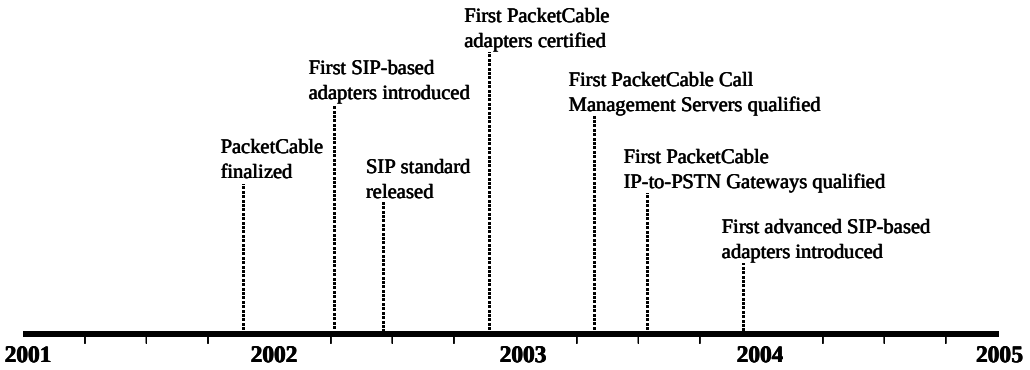
[103] *See* CableLabs Press Release, *Two CMS and Additional PacketCable Devices Get Certified/Qualified in Wave 25* (Apr. 11, 2003); CableLabs Press Release, *PacketCable Media Gateway Among Three New Certified/Qualified Devices* (July 25, 2003); *see also* CableLabs Press Release, *Three Call Management Servers Among 5 New PacketCable Certified/Qualified Devices* (Nov. 14, 2003) (first gateway controller certified PacketCable-compliant in November 2003).

[104] *See, e.g.*, J. Moynihan, *et al.*, Merrill Lynch, *Voice over Broadband* at 2 (June 24, 2003) ("We are now seeing 'virtual' phone-to-phone services that use the public Internet, thanks to recent innovations, including SIP ("Session Internet Protocol") and low cost phone adaptors."); F. Governali, *et al.*, Goldman Sachs, *VoIP – The Enabler of Real Telecom Competition* at 20 (July 7, 2003) ("SIP is the emerging protocol of choice for the VoIP service providers."); *Merrill Lynch Voice over Broadband Report* at *18 ("Vonage uses the SIP protocol."); D. Iler, *AT&T Paves Last Mile with VoIP*, Multichannel News (Mar. 1, 2004) (AT&T's CallVantage is "based on Session Initiation Protocol (SIP) call signaling.").

[105] *See* Vonage Press Release, *Cisco Introduces New SIP-Enabled Voice over IP Solutions* (Mar. 11, 2002) (Introducing, among other VoIP products, the Cisco ATA 186, an analog telephony adapter.")

[106] *See, e.g.*, Motorola Press Release, *Motorola Broadband and Vonage Team to Simplify Broadband Telephony for Consumers and Small Businesses* (Dec. 8, 2003) ("Unique product features of the VT1000v series voice terminal that improve the consumer experience for broadband telephone service are its embedded routing functionality and voice traffic prioritization.").

Figure 3. Technological Evolution of VoIP Equipment



Sources: *See* Appendix H.

Analysts now agree that VoIP routed over private networks fully matches the sound quality of conventional circuit-switched voice[107] – and most broadband service providers have in fact either partnered with backbone providers,[108] or have deployed their own private IP backbones.[109] Even when VoIP is routed over the public Internet, moreover, service quality is comparable to, or better than, typical wireless service – fully adequate for price-sensitive customers, or for those who ascribe more value to the superior features that end-to-end digital service can offer.[110]

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[107] *See, e.g.*, *Merrill Lynch Voice over Broadband Report* at *17 ("We have been testing the Vonage service for some time. In our experience, voice quality is good. Consumer Reports reached the same conclusion in testing reported in the July 2003 issue."); *July 2003 Goldman Sachs VoIP Report* at 15 ("A study conducted by Columbia University Computer Science Associate Professor Henning Schulzrinne concluded that when the Internet is used as the transport network, net VoIP service availability is approximately 98%. . . . initial call failure probability is 0.47% on average, and call abortion (caller hangs up after an interruption) probability is about 1.53% on average").

[108] *See, e.g.*, M. Stump, *MSOs, AT&T Set Table for VoIP Rollouts*, Multichannel News (Dec. 15, 2003) (Time Warner Cable calls will travel from the Time Warner media gateway to either the MCI or Sprint network); Sprint News Release, *Mediacom Communications and Sprint Announce Agreement for Mediacom To Provide Telephony Services* (Aug. 25, 2004) (Mediacom will utilize the Sprint infrastructure to deliver calls).

[109] *See, e.g.*, Cox Communications, *White Paper: Voice over Internet Protocol: Ready for Prime Time* at 3 (May 2004) ("The Cox advantage, in terms of architecture, rests in the fact that it owns and operates its own end-to-end network infrastructure, including a nationwide OC-48 IP backbone network"); F. Governali, *et al.*, Goldman Sachs, *T (IL/C): Analyst Mtg Provides No Arguments for Getting More Positive on Stock* at 2 (Feb. 26, 2004) (AT&T CallVantage service "looks much like what Vonage offers in the market today, except that it will be a managed service, riding on the AT&T network").

[110] *See, e.g.*, *Merrill Lynch Voice over Broadband Report* at *2 ("We believe that a paradigm shift is under way in customer and operator attitudes toward phone service. We suspect that traditional 'telco reliability" . . . matters less than it did – while price, convenience and service matter more"); *id.* at *12 (noting "changing customer preferences with respect to phone service, which in our view lessen the value of 'five nines' telco reliability and increase the value of new services and functionality."); J. Hodulik, *et al.*, UBS, *AT&T Corp.: Unveiling Consumer VoIP* at 2 (Dec. 11, 2003) ("We do not see voice quality as an issue, however, as consumers have increasingly become conditioned to accept lower quality through increased use of wireless calling.").

VoIP services now readily match conventional circuit-switched service in overall functionality as well – backup power,[111] total home wiring,[112] and number portability.[113] *See* Table 7. The addition of such "primary line" functions, AT&T states, requires "less than 10% additional upgrade and rebuild capital."[114] The one primary-line feature that not all VoIP providers have implemented is Enhanced 911 capability. A number of VoIP providers have accordingly adopted alternative 911 capabilities[115] that analysts believe many consumers will find adequate.[116] As discussed further below, VoIP already supports a number of other calling features in addition to those offered to mass-market users of conventional service. *See* Table 7.[117]

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[111] As described above, battery back-up power can now be provided as relatively inexpensive CPE. In any case, as Goldman Sachs notes, "Powering . . . appears to be an issue declining in importance as customers rely more and more on their wireless phones as an 'emergency backup line.' . . . In essence, it is arguable that powering is a 'legacy requirement,' and the customers will drive migration away from the limitations that powering imposes." *July 2003 Goldman Sachs VoIP Report* at 5-6.

[112] *See, e.g.*, J. Halpern, *et al.*, Bernstein Research, *U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable* at 4 (Jan. 9, 2004) ("Time Warner's offering is already more robust, with . . . total home wiring (i.e., all existing phone jacks)"); Cox, *Digital Telephone: Frequently Asked Questions*, http://www.cox.com/roanoke/telephone/faqs.asp (Cox's service will "deliver dialtone to each of you[r] phone jacks."); James Dolan, President & CEO, Cablevision, Presentation to UBS Media Week Conference at 38 (Dec. 11, 2003) ("Whole House Wiring Available . . . in 2004."); AT&T News Release, *AT&T CallVantage Service Expands to 21 New Markets in Seven States in Nationwide Deployment* (Aug. 19, 2004) (announcing "inside wiring for residential subscriber that makes it easier for consumers to hook up multiple home phones to AT&T CallVantage Service replicating the traditional home calling environment").

[113] *See, e.g.*, *Bernstein Cable Telephony Report* at 5 (Time Warner's initial cable IP telephony offering included LNP); Vonage, *Features: Keep Your Phone Number*, http://www.vonage.com/features_lnp.php?refer_id=27400178 (A customer can keep their "existing phone number."); James Dolan, President & CEO, Cablevision, Presentation to UBS Media Week Conference at 38 (Dec. 11, 2003) (LNP will "[c]ome in 2004").

[114] Greg Braden, CTO and EVP, Broadband Services, AT&T Broadband, Investor Presentation at 35 (July 25, 2001).

[115] *See, e.g.*, A. Quinton, *et al.*, Merrill Lynch, *VoIP Update: Notes from the FCC Forum on VoIP* at 3 (Dec. 1, 2003) (Vonage "offer[s] a form of 911 service"); Net2Phone Presentation at 13, *FCC VoIP Forum* (Dec. 1, 2003) (Net2Phone "has a 911 solution in place today"); Covad Press Release, *Covad Announces Voice Over Internet Protocol (VoIP) Deployment Plans* (Feb. 9, 2004) (Covad plans to offer VoIP "[with] emergency 911 . . . [as a] standard feature[]."); AT&T Presentation at 20, *FCC VoIP Forum* (Dec. 2003) ("The National Emergency Number Association (NENA) and VoIP leaders, including AT&T Consumer, reached an agreement on key principles for providing 911 services to VoIP users."); Letter from G. Carberry, Level 3 Communications to L. Rickard, CT DPUC, File # 2729.79443 (Jan. 21, 2004) (Level 3 "intends to provide 911 emergency service access to its Connecticut customers in the short term and in the long term").

[116] *See, e.g.*, A. Quinton, *et al.*, Merrill Lynch, *US VoIP Update: Competitive, Regulatory and Other Issues* at 8 (Nov. 25, 2003) ("Vonage's simple 911 solution, where the user specifies his location such that a call from his "number" reaches the right PSAP (Public Service Answering Point) might well be adequate.").

[117] *See generally id.* at 4 ("Against traditional telecom, VoIP represents a classic disruptive force – cheaper, lower quality perhaps but able to offer services the existing provider can not match."); J. Halpern, *et al.*, Bernstein Research, *Telecom and Cable: VoIP Will Force Regulatory Lines to be Redrawn* at 3 (Nov. 13, 2003) ("[T]he inherent flexibility associated with a software-defined service suggests that feature/functionality of VoIP is likely to eventually significantly outstrip that of the traditional circuit-switched phone network."); *Merrill Lynch Voice over Broadband Report* at *18 ("VoIP enables certain features that are not easily replicated by conventional carriers.").

Consistent with the fact that VoIP now matches the quality and functionality of traditional service, VoIP providers now market their service as a primary-line replacement,[118] and the majority of consumers are now purchasing the service as such. Some 86 percent of Time Warner's Digital Phone subscribers reportedly bring their old phone number with them when they sign up,[119] as do 50 percent of Vonage customers.[120] Cablevision still markets its service as a second-line replacement, but reports that more than a third of its customers use the existing service as primary line service anyway.[121]

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[118] *See, e.g.*, AT&T, *AT&T CallVantage Features*, http://www.usa.att.com/callvantage/what/features.jsp ("With AT&T CallVantage, we're taking your home phone to an entirely new level. One that completely outperforms what traditional telephones can do and revolutionizes how you stay connected."); Vonage, *About Us*, http://www.vonage.com/corporate/aboutus_index.php ("Vonage offers an innovative, feature-rich and cost effective alternative to traditional telephony services."); J. Atkin, *et al.*, RBC Capital Markets, *Cable Update: Telephony and Video/Data/Voice Pricing Developments* at 1 (Mar. 16, 2004) ("[W]e have increasing confidence that cable VoIP deployments will offer stiff competition to RBOC telephony as most MSOs plan to market a primary-line telephony product with the intention of displacing the local telephone company (and having customers port their existing numbers).").

[119] *See Britt/Time Warner Cable Presentation*; *see also* C. Moffett, *et al.*, Bernstein Research Call, *Cable and Telecom: Bernstein Study Finds Consumers Ready and Willing To Switch to Cable Telephony* at 4 (Dec. 9, 2003) ("80-90% of Time Warner's customers in Portland are opting to keep their existing number.").

[120] *See UBS Vonage Story* at 5; A. Quinton, *et al.*, Merrill Lynch, *US VoIP Update: Competitive, Regulatory, and Other Issues* at 9 (Nov. 25, 2003).

[121] *See* C. Moffett, *et al.*, Bernstein Research Call, *Cable and Telecom: Bernstein Study Finds Consumers Ready and Willing To Switch to Cable Telephony* at 4 (Dec. 9, 2003) (Cablevision is currently marketing its service as a second line for regulatory reasons); G. Campbell, *et al.*, Merrill Lynch, *3Q03 Broadband Update: The Latest on Broadband Data and VoIP Services in the U.S. and Canada* at 15 (Nov. 3, 2003) ("*Merrill Lynch 3Q03 Broadband Update*") (at least 37 percent of Cablevision's subscribers have disconnected all other landline service) .

Table 7. Feature Comparison – VoIP vs. PSTN						
Features	**RBOC PSTN**	**Cable-vision**	**Time Warner**	**Cox VoIP**	**AT&T VoIP**	**Vonage**
Primary Line Features						
911	✓	✓	✓	✓	✓	✓
Powering	✓	✓*		✓		
LNP	✓	✓*	✓	✓	✓	✓
Home Wiring	✓	✓	✓	✓	✓	
Traditional Vertical Services on PSTN						
Caller ID	✓	✓	✓	✓	✓	✓
Call Forwarding	✓	✓	✓	✓	✓	✓
Call Waiting	✓	✓	✓	✓	✓	✓
Call Waiting ID	✓		✓	✓	✓	✓
3-way Calling	✓	✓		✓	✓	✓
Voicemail	✓	✓	✓	✓	✓	✓
Call Return	✓	✓		✓		✓
Repeat Dialing	✓			✓		✓
Caller ID Block	✓	✓	✓	✓		✓
Priority Ring				✓		
Choice of Long-Distance Providers	✓			✓		
Second Line	✓					✓
Advanced Features						
Tel. Number Portability					✓	✓
Area Code Selection						✓
Toll-Free Numbers ($4.99/month)						✓
Advanced 411						✓
Online Real-Time Billing						✓
Virtual Phone Numbers						✓
Personal Conferencing					✓	
Call Logs			✓		✓	✓
Online Call Management		✓			✓	✓
Locate Me Service					✓	
Advanced Voicemail		✓			✓	✓

*Scheduled to be implemented in 2004.
Sources: *See* Appendix H.

Finally, VoIP already offers features and functionality in addition to those available on circuit-switched networks, and VoIP is expected to be able to offer an even greater array of new features and functionality in the future.[122] The IP platform is widely viewed as much more flexible than the circuit-switched platform, because it enables new features to be developed and

[122] *See generally Merrill Lynch, Everything Over IP* at 19 ("VoIP features evolution [is] likely to outstrip conventional phone service."); D. Barden, *et al.*, Banc of America Securities, *Straight Talk on VoIP* at 3 (Apr. 15, 2004) ("The vast majority of the presentations from all the operators [at the VoIP seminar] focused on the enhanced capabilities of VoIP, the rate at which it enables innovation and the power it gives consumers to control their experience."); J. Hodulik, *et al.*, UBS, *AT&T Corp.: Unveiling Consumer VoIP* at 3 (Dec. 11, 2003) ("IP provides a platform that, over time, should deliver a richer set of calling features than the traditional PSTN.").

deployed much more quickly and efficiently.[123] Vonage has apparently "been deploying a new service feature every six weeks, on average (which it can achieve with a software push to the adapter). This compares to as much as a year or more in the traditional incumbent environment."[124]

VoIP providers are already promoting the advanced features of their service. AT&T's CallVantage offers "multiple advanced features such as call logs, unified messaging, settable do-not-disturb periods, 'locate me' functionality, and virtual conference call functionality."[125] AT&T recently added new capabilities – "the first in a long series of innovations the company plans to add" – which include an online, searchable phone book with storage for up to 250 names and phone numbers, the ability to send alerts and to forward voicemail messages to multiple e-mail recipients, and the ability to add up to nine additional phone numbers to the same line.[126] Vonage enables customers to "alter their phone line's settings (call forwarding, call waiting, etc.), track real-time usage, or check voice mail all through the Internet."[127] Packet8 "offer[s] a videophone service and hardware."[128] VoicePulse offers an "'Open Access' plan, which allows subscribers to use the service via any appropriately configured device such as a PDA, laptop, or IP phone."[129] Analysts and service providers expect an even wider array of features to be introduced in the future, as VoIP services become more integrated with data and video.[130]

B. Wireless

Since the *Triennial Review Order*, the number of consumers abandoning their wireline phone entirely for wireless has nearly doubled, and far more consumers are now using their wireless phone as their primary phone. Wireless prices have continued to decline, and have been

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[123] *See, e.g.*, J. Halpern, Bernstein Research, *U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable* at 4 (Jan. 9, 2004) (noting the "flexibility of IP-based telephony platforms"); *Merrill Lynch Voice over Broadband Report* at *7, *37 ("VoIP has inherent advantages in its greenfield all-IP architecture and voice/data/ multimedia integration." "It is not difficult to imagine that before long, VoIP will have a clear advantage over conventional telephony in terms of features, vendor support and R&D spending.").

[124] D. Barden, *et al.*, Banc of America Securities, *Straight Talk on VoIP* at 3 (Apr. 15, 2004).

[125] L. Warner, *et al.*, Credit Suisse First Boston, *AT&T Launches VoIP in New Jersey: Competition for Voice Customers Accelerating* at 1 (Mar. 29, 2004).

[126] AT&T News Release, *AT&T Adds New Features and Enhances AT&T CallVantage Service* (May 27, 2004); AT&T News Release, *AT&T Adds More Advanced Calling Features to AT&T CallVantage Service* (Sept. 15, 2004).

[127] *Parks Associates Residential VoIP Analysis* at 4-3.

[128] *Parks Associates Residential VoIP Analysis* at 4-4.

[129] *Parks Associates Residential VoIP Analysis* at 4-6.

[130] *See, e.g.*, *Merrill Lynch, Everything Over IP* at 23; J. Halpern, Bernstein Research, *U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable* at 4 (Jan. 9, 2004); *Merrill Lynch Voice over Broadband Report* at *7. *See also Hearing of the Senate Committee on Commerce, Science and Transportation*, Federal News Service (May 12, 2004) (Comcast president & CEO Brian Roberts: "[T]he IP platform lets us offer a differentiated product with services like integrated messaging so you can check your email and voice mail together on any number of different devices – as we saw some truly incredible IP videophones at the cable industry's national show in New Orleans just last week – it gets me even more excited.").

a significant factor in forcing concomitant declines in wireline prices. The coverage and reliability of wireless networks has continued to improve due to recent investments by wireless providers, and the overwhelming majority of consumers now view wireless quality as perfectly adequate for voice. The ability of wireless phones to handle data traffic also has improved considerably since the *Triennial Review*, and is comparable to the capabilities available on a narrowband analog loop. Although wireless broadband is still in its early stages, the ability of wireless to compete with a wireline local telephone company on that score is irrelevant, given that two out of three broadband subscribers obtain broadband connections from their cable company.

1. Wireless-Wireline Competition

Since the *Triennial Review*, the number of wireless subscribers has grown from less than 129 million to at least 161 million – as compared to approximately 181 million wireline access lines.[131] Some 20 million new wireless subscribers are being added annually,[132] whereas wireline access lines are declining,[133] in large part due to wireless growth. Analysts accordingly expect that "the number of cell phone users will exceed the number of US wireline access lines some time during 2005."[134]

An increasing share of wireless subscribers are abandoning their wireline phone. *See* Table 8.[135] Since the *Triennial Review*, the percentage of wireless users that have given up wireline service has grown from 3-5 percent to 7-8 percent.[136] Approximately 2.7 million

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[131] *Triennial Review Order* ¶ 53 (citing *Local Competition Report* data as of mid-2002); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Ninth Report ¶ 174, WT Docket No. 04-111, FCC 04-216 (rel. Sept. 28, 2004) ("*Ninth CMRS Report*") (wireless subscribers as of year-end 2003); Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of December 31, 2003* at Table 1 (June 2004) ("*June 2004 Local Competition Report*") (wireline data as of year-end 2003). The estimate for wireline access lines does not include lines served by carriers with fewer than 10,000 switched access lines in a state. *June 2004 Local Competition Report* at 1.

[132] *See, e.g.*, CTIA, *CTIA's Semi-Annual Wireless Industry Survey Results, June 1985 – December 2003*, http://files.ctia.org/pdf/CTIA_Semiannual_Survey_YE2003.pdf. *See also June 2004 Local Competition Report* at Table 13.

[133] *See, e.g.*, *June 2004 Local Competition Report* at Table 1 (End-user switched access lines have declined steadily since their peak in December 2000).

[134] Adam Quinton, Managing Director & First Vice President, Co-Head of Global Telecom Services Research, Merrill Lynch, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC (Feb. 4, 2004) ("*Quinton/Merrill Lynch Testimony*").

[135] *See generally Merrill Lynch Voice over Broadband Report* at *19 ("Declining costs and improving quality in wireless make it inevitable that wireline minutes will continue to migrate to wireless – and that an increasing proportion of customers will look to disconnect wireline service entirely."); J. Bazinet, *et al.*, JP Morgan, *The Art of War* at 7 (Nov. 7, 2003) ("an increasing number of consumers are turning off their wireline phone altogether and using their wireless phone as their primary phone.").

[136] *See Triennial Review Order* ¶ 445; *id.* ¶ 230; *Quinton/Merrill Lynch Testimony* ("an estimated 7% of telephone users only have a cell phone"); Michael Balhoff, Managing Director, Legg Mason, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC (Feb. 4, 2004) ("[W]hile it is clear that there is substitution whereby wireless-only customers may be 8% of the total consumer market today, it is admittedly difficult to calculate precise figures."); B.

additional wireless subscribers are now giving up their wireline phones each year.[137] An even larger percentage of young consumers – which will make up the next generation of homeowners – are disconnecting their wireline service (or never purchase wireline service in the first place), which makes it likely that the rate of substitution will increase even further in the future.[138] Analysts accordingly predict that within four years, approximately 22 million access lines – approximately 13 percent of total access lines – will be displaced by wireless. *See* Figure 4.[139]

Table 8. Wireless-Wireline Competition – Then and Now

	Then	**Now**
Wireless Subscribers	129 million	161 million
Wireless Penetration	49%	54%
% of Users with Wireless as Their Only Phone	3-5%	7-8%
Cumulative Primary Access Lines Displaced	5 million	11 million
Wireless as a % of All Voice Traffic	16%	29%
Average Wireless Minutes of Use (per month)	384	652

Sources: See Appendix H.

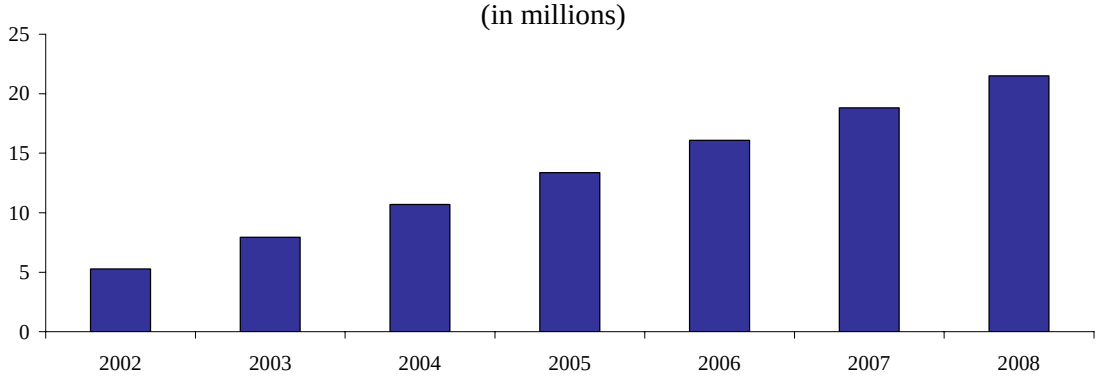
Bath, Lehman Brothers, *Consumer VoIP Threat Overdone* at Figure 2 (July 1, 2004) ("*July 2004 Lehman Brothers VoIP Report*") (estimating 7% displacement in 2003 and 8% displacement in 2004).

[137] *See July 2004 Lehman Brothers VoIP Report* at Figure 2.

[138] Frank Louthan, Vice President, Equity Research, Raymond James, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC (Feb. 4, 2004) ("*Louthan/Raymond James Testimony*") ("We believe the roughly 9.6% of the population that are single between the ages of 20 and 34 are the most likely to disconnect their wireline phone for a wireless phone (with a significant proportion of this age group having already done so). As young consumers between 15 and 19 (another 6.6% of the U.S. population) become households, we believe these households could become prime wireless substitution candidates."); A. Quinton, *et al.*, Merrill Lynch, *Telecom Services: Unraveling Revenues* at 5 (Nov. 20, 2003) ("[W]e believe that demographic trends favor wireless. . . . So, as the US population ages, more young people are likely to become wireless subscribers – and either displace the purchase of a wireline service with wireless or cut the cord on an existing line."); S. Ellison, IDC, *U.S. Wireline Displacement of Wireline Access Lines Forecast and Analysis¸2003-2007* at 7 (Aug. 2003) ("The first communications services purchased by youth and young adults are now often wireless services. Adoption of wireless by teenagers is increasingly being translated into forgoing traditional primary access lines when such wireless users go to college or otherwise establish their own households.").

[139] *See* S. Ellison, IDC, *U.S. Wireless Displacement of Wireline Access Lines Forecast and Analysis¸ 2003-2007* at Table 9 (Aug. 2003); *see also* C. Wheelock, In-Stat/MDR, *Cutting the Cord: Consumer Profiles and Carrier Strategies for Wireless Substitution* at 4 (Feb. 2004) (In-Stat/MDR predicts, in its "base scenario forecast", which is the "most likely outcome," that 29.8% of wireless subscribers will not have a landline by 2008.).

Figure 4. Primary Access Lines Displaced by Wireless
(in millions)



Source: Lehman Brothers estimates. *See* Appendix H.

An even greater share of wireless customers – at least 14 percent of U.S. consumers – now use their wireless phone as their primary phone.[140] The Commission's own rules now require porting of wireline telephone numbers to wireless phones, precisely because wireline customers are making their wireless phone their primary or only phone.[141] As of the end of July 2004, 544,000 consumers had transferred their landline telephone number to a wireless phone.[142]

Still greater amounts of traffic are migrating from wireline to wireless networks. Merrill Lynch estimates that "approximately 23% of voice minutes in 2003 were wireless," and that for 2004 "wireless could make up approximately 29% of voice minutes in the US."[143] The Yankee Group estimates that 43 percent of long-distance calls are now made on wireless phones.[144] Wireless voice minutes are currently rising at 36 percent per year,[145] while minutes on landline

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[140] C. Wheelock, In-Stat/MDR, *Cutting the Cord: Consumer Profiles and Carrier Strategies for Wireless Substitution* at 1 (Feb. 2004) ("14.4% of US consumers currently use a wireless phone as their primary phone").

[141] *Telephone Number Portability*, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 23697, ¶ 22 (2003) ("We conclude that, as of November 24, 2003, LECs must port numbers to wireless carriers."); *id*., Separate Statement of Chairman Michael K. Powell ("By firmly endorsing a customer's right to untether themselves from the wireline network – and take their telephone number with them – we act to eliminate impediments to competition between wireless and wireline services.").

[142] *See* H. Weaver, *FCC Wants To Slash Time Allowed for Wireline to Wireless Porting*, RCR Wireless News at 4 (Sept. 13, 2004).

[143] D. Janazzo, *et al.*, Merrill Lynch, *The Next Generation VIII: The Final Frontier?* at 5 (Mar. 15, 2004); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Eighth Report, 18 FCC Rcd 14873, ¶ 102 (2003) ("*Eighth CMRS Report*") ("One analyst estimates that wireless has now displaced about 30 percent of total wireline minutes."); *Ninth CMRS Report* ¶ 213 ("One analyst estimated . . . that 23 percent of voice minutes in 2003 were wireless, up from 7 percent in 2000.").

[144] Yankee Group News Release, *U.S. Consumer Long Distance Calling Is Increasingly Wireless, Says Yankee Group* (Mar. 23, 2004), http://www.yankeegroup.com/public/news_releases/news_release_detail.jsp?ID=PressReleases/news_03232004_cts_2.htm.

[145] *Quinton/Merrill Lynch Testimony*.

networks are declining.[146] The Yankee Group predicts that the wireline displacement market could be worth as much as $50 billion by 2006.[147]

2. Pricing

Wireless service is now competitive with wireline service with respect to price, despite the fact that regulatory subsidies still keep wireline prices artificially low.[148] One Wall Street analyst notes that "[w]ireless pricing dropped below wireline pricing in 2003 for the first time. Therefore, wireless displacement not only shifts traffic from wireline networks, but it also erodes revenues and profits for the Bells."[149] Many other analysts have reached the same conclusion, as the Commission itself has recognized.[150]

Even without factoring in the added value of mobility, wireless is now price competitive with wireline for the average consumer. As demonstrated in § II.A.2 above, the average U.S. households spends $47 per month for wireline local and long-distance service, including some mix of vertical features.[151] Consistent with this, the main wireline local carriers – including incumbent LECs as well as cable operators – offer bundled offerings that include unlimited local and long-distance service plus several vertical features for approximately $50 per month. Wireless carriers are now offering comparable bundles throughout the country. *See* Table 9 & Appendix B (showing other market-by-market comparisons of wireless and wireline bundles).[152] As the Commission has found, "[t]he number of mobile wireless carriers offering service plans designed to compete directly with wireline local telephone service continues to increase."[153]

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[146] *See, e.g.*, Ind. Anal. & Tech. Div., WCB, FCC, *Trends in Telephone Service* at Table 10.1 (Aug. 2003); S. Flannery, *et al.*, Morgan Stanley, *Telecom Services: Trend Tracker: Spring Break! Some Temporary Telecom Relief* at Exhibit 53 (Mar. 18, 2004).

[147] *See More Mobile Data Services Revenues Wait in Fixed World*, Wireless Data News (Sept. 24, 2003).

[148] *See, e.g.*, *Application by Verizon New England Inc., et al., for Authorization to Provide In-Region, InterLATA Services in Vermont*, Memorandum Opinion and Order, 17 FCC Rcd 7625, ¶ 68 (2002) ("In many states . . . higher business rates subsidize some residential rates, and, consequently, certain residential services are priced below cost."); *Sprint v. FCC*, 274 F.3d 549, 555 (D.C. Cir. 2001) (noting that the FCC's counsel argued that "state commissions have historically set relatively low residential rates, especially rural ones, allowing the incumbent monopoly to make it up in other aspects of their business.").

[149] V. Grover, Needham, *New Year's Resolution – Avoid the Bells* at 1 (Dec. 29, 2003).

[150] *See Eighth CMRS Report* ¶ 104 (citing Blake Bath, Merrill Lynch, UBS Warburg); *see also Ninth CMRS Report* ¶¶ 212-213 (citing Merrill Lynch, Goldman Sachs).

[151] Ind. Anal. & Tech. Div., WCB, FCC, *Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service* at Table 2.6 (July 2004).

[152] S. Flannery, *et al.*, Morgan Stanley, *2004 in Prospect: Listening to the Investor* at 8 (Jan. 12, 2004) ("Already some wireless carriers like MetroPCS offer unlimited calling for $40 per month, which is very competitive with wireline pricing.").

[153] *Ninth CMRS Report* ¶ 215.

Table 9. Wireless Local/Long-Distance Bundles in Selected U.S. Markets*

	AT&T Wireless	Cingular Wireless	Nextel	Sprint PCS	T-Mobile	Verizon Wireless	Other
New York, NY	$50	$50	$60	$40	$40	$60	-
Los Angeles, CA	$50	$50	$60	$40	$40	$50	-
Houston, TX	$50	$50	$60	$40	$40	$50	-
San Diego, CA	$50	$50	$60	$40	$40	$50	-
Tampa, FL	$50	$50	$60	$40	$40	$50	-
Kansas City, MO	$50	$50	$55	$40	$40	$50	-
San Antonio, TX	$50	$50	$55	$40	$40	$50	-
Columbus, OH	$50	$50	$55	$40	$40	$50	-
Milwaukee, WI	$50	$50	$55	$40	$40	$50	-
Charlotte, NC	$50	$50	$55	$40	n/a	$50	$45 ALLTEL
Bridgeport, CT	$50	$50	$60	$40	$40	$60	-
Raleigh, NC	$50	$50	$55	$40	n/a	$50	$45 ALLTEL
Syracuse, NY	$50	$50	$60	$40	$40	$50	-
Portland, ME	$50	n/a	$60	$40	$40	$60	$75 US Cellular
Roanoke, VA	n/a	n/a	$60	$40	$40	$60	$50 SunCom

* Prices for each carrier are for a wireless plan with 500 anytime minutes a month (or closest number of minutes above 500), with nationwide long distance included, and typically unlimited night & weekend minutes. In most cases, similar plans with a smaller local calling area are available for a lower monthly price.

n/a indicates that the carrier does not provide service in this particular city.

Sources: See Appendix H.

Wireless prices have declined rapidly – by as much as 10 to 20 percent a year in recent years.[154] Wireless providers also have increased the number of off-peak minutes they make available on their plan. As a result, many consumers now view wireless long-distance service as effectively "free."[155] New pre-paid wireless plans – which have been prevalent in Europe for many years – are now being introduced and make wireless even more attractive for customers that do not make a lot of calls.[156] The largest pre-paid wireless provider in the U.S. – Virgin Mobile – now has 1.75 million subscribers.[157]

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[154] *Ninth CMRS Report*, Appendix A at Table 9 (showing average revenue per minute declining every year since 1995 (1998: 21%; 1999: 23%; 2000: 20%; 2001:30%; 2002: 9%; 2003: 13%)).

[155] *Louthan/Raymond James Testimony* ("We believe consumers now view wireless long distance as free and are therefore more likely to use their wireless phone to make long distance calls."); V. Shvets, *et al.*, Deutsche Bank, *AT&T Corporation: Irrational Exuberance, Rating Downgraded* at 2 (Jan. 9, 2004) ("The aggressive bundling by the RBOCs and nationally based wireless pricing has essentially killed consumer long-distance as a stand-alone product. It is no longer a question of whether but rather how quickly consumer long-distance revenue will essentially disappear."); J. Bazinet, *et al.*, JP Morgan, *The Art of War* at 3 (Nov. 7, 2003) ("Long-distance voice will likely be the biggest casualty on the telecom battlefield with two players (wireless and cable) essentially giving away the service for free.").

[156] *See, e.g.*, Virgin Mobile, http://www.virginmobileusa.com/home.do; AT&T Wireless, *GoPhone*, http://www.attwireless.com/personal/gophone/index.jhtml. *See* L. Mutschler, *et al.*, Merrill Lynch, *The Next Generation VII: Comparing European and US Wireless* at 18 (Feb. 21, 2003) ("[W]e estimate that at the end of 3Q

Studies have shown that even though there have been steep declines in per-minute wireless rates, average revenue per user "has held relatively constant (or even increased)" because there is "price elasticity of demand for voice usage."[158] In other words, as wireless rates decrease, consumers are increasingly making calls using their wireless phone instead of their wireline.[159] Consistent with this view, as wireless traffic has increased, there has been a concomitant decrease in wireline traffic.[160]

3. Quality and Functionality

Since the *Triennial Review*, wireless network quality has continued to improve. The large and rapidly growing rate of wireline-to-wireless displacement demonstrates that many consumers already view the quality of wireless networks more than adequate for voice calls. Consumer surveys likewise indicate that the vast majority of wireless subscribers are very satisfied with the quality of their wireless service. And, given that wireless service now often costs less than wireline, many consumers would be willing to exchange their wireline for wireless even if there was some difference in quality or functionality.[161]

One key measure of quality on a wireless (or wireline) network is the call completion rate. A study by the GAO found that the "industry standard" in the wireless industry is a "98 percent call-completion rate."[162] Consistent with these findings, GAO found that the vast

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02, penetration in the US was 48% versus 80% in Europe. One of the reasons for this difference has been the lack of the development of a large pre-paid market in the US."); M. Janiga, *et al.*, Lazard, *Wireless Services: Lazard/Harris Interactive Wireless Survey: Macro Industry Data and WNP Outlook* at 12 (Nov. 21, 2003) ("According to our survey, more than 58% of the respondents who stated that they currently don't own/use a wireless/cell phone but may get one in the future have a household income of less than $35,000. These results support our thesis that wireless companies will continue to face pressure to lower prices and/or develop new services (e.g., prepaid) to attract the incrementally more price-sensitive customer.").

[157] Virgin Mobile Press Release, *Virgin Mobile USA Passes 1.75 Million Subscriber Mark* (Mar. 15, 2004).

[158] P. Cusick, *et al.*, Bear Stearns, Investext Rpt. No. 7397790, Non-Public Operators Steal the Show . . . Again – Industry Report at *31 (May 20, 2003).

[159] L. Mutschler, *et al.*, Merrill Lynch, *The Next Generation VII: Comparing European and US Wireless* at 40 (Feb. 21, 2003) ("Given the structure of US Wireless pricing, the incremental price of using a US Wireless minute, when you have a very large wireless bundle with virtually unlimited night and weekend minutes, is basically zero. This means that it is an easy decision for a person to pick up the wireless phone to make a call instead of picking up a fixed line phone.").

[160] *See, e.g.*, D. Janazzo, *et al.*, Merrill Lynch, *The Next Generation VIII: The Final Frontier?* at 42 (Mar. 15, 2004) (estimating that wireline dial equipment minutes (excluding usage for dial-up Internet access) have declined from 3.694 trillion minutes in 2001 to 3.251 trillion in 2004 while wireless MOUs have increased from 402.8 billion in 2001 to 750.4 billion in 2004).

[161] *See, e.g.*, R. Talbot, RBC Markets, *Battle for the Broadband Home* at 7 (Jan. 27, 2004) (Wireless "has gained a general level of acceptance among consumers. Consumers appear to be more willing to accept a modest reduction in the level of reliability in return for other benefits (especially low price, and improved convenience)."); *Louthan/Raymond James Testimony* ("A key change in consumer preference would include acceptance of less than '5-9's' reliability for phone coverage, which I believe is already to emerging, as evidenced by the significant numbers of consumers that already view wireless as an acceptable alternative to a landline phone.").

[162] General Accounting Office, FCC Should Include Call Quality in Its Annual Report on Competition in Mobile Phone Services at 22, Report No. GAO-03-501 (Apr. 2003) ("While carriers did not provide us with detailed information on blocked and dropped calls, network officials at two carriers said that their goal was to have a 98

majority of consumers do not experience problems with dropped calls.[163] Another study by CTIA and Telephia similarly found that "on average wireless customers, in core and suburban areas, can expect to place, hold and complete a conversation of acceptable audio quality 96-99 % of the time."[164] In any event, to the extent consumers do experience problems with dropped calls, it is due to the subscriber moving locations during the call,[165] a feature that wireline networks do not offer in the first place.

A second standard measure of network quality is geographic coverage. Since the *Triennial Review*, carriers have invested heavily to improve the network coverage,[166] particularly as competition between wireless providers has intensified.[167] Analysts have found that "[b]arriers to wireline replacement, particularly network coverage and quality-of-service, are relatively low and that wireless carriers are working aggressively to neutralize these shortcomings."[168] In addition, new "signal booster antennas" – which are "available from wireless infrastructure vendors such as Qualcomm, Motorola, and Nokia and are usually distributed through wireless service providers" – allow wireless subscribers to improve the quality of the wireless signal they receive inside their home.[169]

Consistent with these developments, consumers now report high levels of satisfaction with the quality of their wireless service. For example, the GAO found that 83 percent of wireless users were satisfied with the call quality of their cell phone, while only 9 percent were

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percent call-completion rate. . . . These officials and those at other carriers said that 98 percent is generally the industry standard.").

[163] General Accounting Office, *FCC Should Include Call Quality in Its Annual Report on Competition in Mobile Phone Services* at 29, Report No. GAO-03-501 (Apr. 2003) (finding that 78 percent of consumers either did not experience problems with dropped calls or only experienced problems on fewer than 10 percent of their calls.).

[164] CTIA Press Release, *Market Research Finds Outstanding Wireless Network Performance* (July 18, 2001).

[165] *See* FCC, *Understanding Cell Phone Coverage Areas*, http://www.fcc.gov/cgb/consumerfacts/cellcoverage.pdf ("When a carrier fails to hand off a call in progress as a consumer travels from one part of the carrier's network to another, it is called a 'dropped call.'").

[166] B. Bath, Lehman Brothers, *Wireless Services: Industry Update: Increasing Demands Drive 04 Capex Higher* at 5 (Dec. 5, 2003) ("much of the increases" that wireless carriers are making in capital spending in 2004 are "coverage-related," – "almost all [wireless carriers] express a desire to increase coverage at the edges of their networks or to fill in holes in their coverage.").

[167] L. Mutschler, *et al.*, Merrill Lynch, *US Wireless Services: The Year Ahead 2004* at 1 (Jan. 9, 2004) (increased focus on "network coverage and quality will become even more important" due to wireless local number portability, which creates additional competition among wireless providers.).

[168] C. Wheelock, In-Stat/MDR, *Cutting the Cord: Consumer Profiles and Carrier Strategies for Wireless Substitution* at 60 (Feb. 2004).

[169] C. Wheelock, In-Stat/MDR, *Cutting the Cord: Consumer Profiles and Carriers Strategies for Wireless Substitution* at 52 (Feb. 2004); *see also* J. Van, *Wireless Phones Try to Connect in High Places*, Chicago Trib. (Jan. 17, 2004) ("A consumer can buy a booster antenna, put it on top of the house, and spread the cell phone signal to all rooms in the house.") (quoting Andrew Cole, SVP, Adventis); Eagle ID, *Cellular Signal Repeater & Boosters*, http://www.eagleid.com/wireless/boost.htm ("Do you need cellular/PCS service inside your home, office, RV, or yacht but don't have a good signal inside? The new DA4000SBR dual band cellular amplifier/repeater can solve these problems without a physical connection to the cell phone (no wires) by externally transmitting your cell phones's signal.").

dissatisfied.[170] A September 2004 survey by J.D. Power and Associates found that "[o]verall satisfaction with wireless service providers has increased 5 percent over 2003," and that satisfaction with call quality increased by 7 percent during that same period.[171] Analysts similarly report that "[c]ultural awareness and acceptance of wireless as an acceptable/preferred communication medium is growing."[172] Wireless "has gained a general level of acceptance among consumers. Consumers appear to be more willing to accept a modest reduction in the level of reliability in return for other benefits (especially low price, and improved convenience)."[173]

The data capabilities of wireless networks also have improved considerably since the *Triennial Review*. Insofar as narrowband data capabilities are concerned – which the majority of U.S. households that use Internet access still purchase[174] – wireless is now on a par with wireline. Narrowband wireless data capabilities that offer speeds of between 50-130 kbps are now available nearly every place wireless voice service is available, which is to say the vast majority of the country.[175] A large and increasing share of wireless subscribers are now using phones that are capable of using these new data capabilities[176] as well as actually subscribing to the data services they make possible.[177] Sales of laptop computers – which are now routinely equipped with wireless modems – have likewise accelerated significantly in the last two years.[178]

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[170] General Accounting Office, *FCC Should Include Call Quality in Its Annual Report on Competition in Mobile Phone Services* at 27, Report No. GAO-03-501 (Apr. 2003).

[171] J.D. Power and Associates Press Release, *J.D. Power and Associates Reports: Satisfaction with Wireless Service Providers Increases Significantly as Customers Report Higher Ratings in Call Quality and Cost-Related Attributes* (Sept. 9, 2004).

[172] S. Ellison, IDC, *U.S. Wireless Displacement of Wireline Access Lines Forecast and Analysis, 2003-2007* at 4 (Aug. 2003).

[173] R. Talbot, RBC Markets, *Battle for the Broadband Home* at 7 (Jan. 27, 2004).

[174] *See, e.g.*, R. Bilotti, *et al.*, Morgan Stanley, *Cable/Satellite & Telecom Cross-Industry Insights: Broadband Update – Tiering Strategies* at 6 (Apr. 12, 2004) ("Narrowband subscribers continue to dominate Internet user market share at 70%, with the remainder split between cable modem and DSL."); G. Arlen, *TR's Online Census* (4Q 2003) (As of the fourth quarter of 2003, 68.9% of online households access the Internet via a narrowband connection.).

[175] *See Ninth CMRS Report* ¶ 138 ("CDMA 1xRTT and/or 1xEVDO has been launched in at least some portion of counties containing 273 million people, or roughly 96 percent of the U.S. population, while GPRS has been launched in at least some portion of counties containing 264 million people, or about 93 percent of the U.S. population.").

[176] M. McCormack, *et al.*, Bear Stearns, *Verizon Communications: Growth Businesses Highlight In Line Quarter* at 7 (Apr. 27, 2004) (Verizon "reported that 63% of the customer base has 1X-enabled phones compared with 52% in 4Q03."); Sprint Press Release, *Sprint Reports First Quarter Results* (Apr. 20, 2004) (Sprint reports that 80% of the "post-paid retail customer base" is using 1xRTT handsets and 48% of the same base are using PCS Vision handsets.).

[177] *Ninth CMRS Report* ¶ 182 (68 percent of AT&T Wireless subscribers use two-way SMS-capable handsets); C. Fleming, *et al.*, UBS Investment Group, *AT&T Wireless Group Inc.: Weak, But Not Disastrous 1Q04 Results* at 4 (Apr. 26, 2004) ("[AT&T Wireless] said that more than 40% of its GSM customers sign up for GPRS service (i.e., mMode). This compares to the 'over 35%' figure cited last quarter. AWE said that these customers pay, on a monthly basis, in the $6.50 - $7 range (versus the about $7 - $8 monthly range cited last quarter) for mMode services. Also, AWE said that it is collecting over $3.75 of SMS revenue monthly from almost one quarter of its total customer base."); Sprint Press Release, *Sprint Reports First Quarter Results* (Apr. 20, 2004) ("At the end

There is now a full-fledged equivalent to e-mail, the most-used wireline data application, available on wireless networks. In July 2002, interoperability for SMS (short messaging service), which has been used extensively in Europe for years,[179] was first implemented in the U.S., and has been "gaining traction" ever since.[180] The Yankee Group now estimates that "nearly 15 percent of all wireless subscribers actively use SMS," and notes that some carriers "report that as much as 25 to 30 percent of their base uses SMS."[181] In the first quarter of 2004, more than 2.6 billion SMS messages were sent in the U.S.[182] Wireless data revenues – nearly half of which is derived from SMS[183] – have been steadily increasing both in absolute terms and as a percentage of total wireless revenues.[184]

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of the period more than six million customers were subscribing to Sprint PCS data services, including more than four million Sprint PCS Vision customers."); *id*. (55% of gross adds in the first quarter were PCS Vision customers.).

[178] *See, e.g.*, *Notebook Sales Grow*, N.Y. Times (Feb. 23, 2004) ("Mobile machines accounted for more than 35 percent of all PC's sold in retail stores [in 2003], up from 29 percent in 2002 and 23 percent in 2001) (citing NPD Techworld); M. Ward, *Wireless Net Marches Forward*, BBC News (Feb. 20, 2003), http://news.bbc.co.uk/1/hi/technology/2783923.stm ("90% of laptops will be wi-fi enabled by 2005") (citing Anand Chandrasekher, vice president and general manager, Intel's mobile platforms group); *The Future of Wireless Networking*, InsideIT (Nov. 2003), http://www.asu.edu/it/fyi/insideit/2003/11/article1.html ("Wireless cards are included in many new laptops and PDAs.").

[179] *See, e.g.*, J. Cox, *A Selling Opportunity for Text Messaging*, News Observer (Raleigh, NC) (Mar. 25, 2003) ("More than half of mobile-phone subscribers in Europe used text messaging last year, yielding $12 billion in revenue for carriers, according to the Yankee Group, a market research firm in Boston."); L. Carvalho, *et al.*, Morgan Stanley, Investext Rpt. No. 7255357, Wireless Telecom Services – A Look at Wireless Data: Don't Short SMS – Industry Report at *4 (Mar. 4, 2003) ("For 2002 alone, wireless data revenues [in Europe] totaled Euro13.8 billion ($14.8 billion) – almost 10 times more than in the United States.").

[180] D. Janazzo, *et al.*, Merrill Lynch, *The Next Generation VIII – The Final Frontier?* at 36 (Mar. 15, 2004) ("SMS in the US is starting to gain traction. Remember that SMS interoperability in the US only was implemented in July 2002."); *see also* Yankee Group, *Carriers Strive to Expand and Finesse SMS Market*, Research Showcase (June 2003), http://www.yankeegroup.com/public/home/research_showcase.jsp?ID=9775 ("After 1 year of intercarrier SMS interoperability, the user base is finally growing.").

[181] Yankee Group, *Carriers Strive to Expand and Finesse SMS Market*, Research Showcase (June 2003), http://www.yankeegroup.com/public/home/research_showcase.jsp?ID=9775.

[182] *See* M. Richtel, *All Thumbs, without the Stigma*, N.Y. Times on the Web (Aug. 12, 2004), http://att.com.com/All+thumbs%2C+without+the+stigma/2100-1041_3-5306843.html?tag=prntfr (citing Yankee Group estimates).

[183] *See* D. Janazzo, *et al.*, Merrill Lynch, *The Next Generation VIII: The Final Frontier?* at 36 (Mar. 15, 2004).

[184] *See, e.g.*, D. Janazzo, *et al.*, Merrill Lynch, *The Next Generation VIII: The Final Frontier?* at 37, Table 28 (Mar. 15, 2004) ("In 4Q 03, the contribution from data continued to advance at several carriers, with the percentage of ARPU from data as follows: Sprint PCS 5%, T-Mobile USA 3.5% and Verizon Wireless 3%." Merrill Lynch reports that data revenue accounts for 2% of service revenue overall in the US in 2003 and estimate that it will account for 3.8% of revenue in 2004.); C. Fleming, *et al.*, UBS Investment Group, *AT&T Wireless Group Inc.: Weak, But Not Disastrous 1Q04 Results* at 4 (Apr. 26, 2004) ("[AT&T Wireless] Management said revenues from its mobile multimedia services division doubled last year and the company expects these revenues to more than double this year.").

Finally, wireless carriers are now beginning to deploy broadband capabilities that are comparable to cable and DSL,[185] and high-speed Internet access also is available at the over 15,000 and growing Wi-Fi hot spots located throughout the U.S.[186] And although wireless broadband is not yet as ubiquitous as wireline broadband, that is irrelevant to any proper competitive analysis. As noted above, the majority of U.S. households that use wireline data services still use narrowband dial-up Internet access. And for the growing segment of consumers that use broadband services, two out of three obtain that service from their cable company, not from the local telephone company.

C. Circuit Switching and Wireline Loops

As described above, the main sources of facilities-based competition for mass-market customers are packet-switched broadband connections and mobile wireless networks. But competing carriers also operate a large embedded base of circuit switches that have been used to serve millions of mass-market customers in the past.

1. Competitive Switch Deployment

At the time of the *Triennial Review Order*, competing carriers had deployed approximately 1,200 circuit switches.[187] These switches were so ubiquitous that they were being used to serve customers in wire centers that contain at least 86 percent of all BOC switched access lines.[188] Each of these switches – just like each ILEC switch – can be used to serve both enterprise and mass-market customers. The analog-line interfaces used to interface with the analog loops that serve mass-market customers can be added to a switch just as easily as the digital line and trunk interfaces that serve enterprise customers.[189]

Competing carriers appear to have deployed few new circuit switches in the past two years.[190] During this time they have focused instead on deploying new softswitch technology, as well packet switches, which are more economical still. As the CEO of one CLEC using these

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[185] *See* Appendix A, § B.4.

[186] *See, e.g.*, Forbes, *Hot Spot Finder*, http://forbes.jiwire.com/ (15,958 hotspots in the U.S. as of September 2004).

[187] *See* New Paradigm Resources Group, Inc., *CLEC Report 2003*, Ch. 4 at Table 14 (17th ed. 2003) (1,154 circuit switches, excluding the 46 circuit switches deployed by Qwest and SBC Telecom, as of year-end 2002). The *Triennial Review Order* found that 1,300 CLEC circuit switches had been deployed based on data that the ILECs had compiled from Telcordia's Local Exchange Routing Guide ("LERG"). *See Triennial Review Order* ¶ 39. Because we were unable to obtain current LERG data, we rely here on New Paradigm's estimates for both current and previous time periods. According to New Paradigm, CLECs had deployed 1,177 circuit switches as of the end of 2003. New Paradigm Resources Group, Inc., *CLEC Report 2004*, Ch. 4 at Table 17 (18th ed. 2004) ("*CLEC Report 2004*") (excluding the 56 circuit switches deployed by Qwest and SBC Telecom).

[188] *Triennial Review Order* ¶ 39.

[189] *See generally, e.g.*, A. Michael Noll, *Introduction to Telephones and Telephone Systems* at 190-195 (3d ed. 1998) (describing modular structure of 5ESS switch).

[190] According to New Paradigm's *CLEC Report*, CLECs had deployed 1,154 circuit switches as of YE 2001, and had in place 1,177 as of YE 2003. *See* New Paradigm Resources Group, Inc., *CLEC Report 2003*, Ch. 4 at Table 14 (17th ed. 2003); *CLEC Report 2004*, Ch. 4 at Table 17 (excluding the 46 and 56 circuit switches deployed by Qwest and SBC Telecom in 2001 and 2003, respectively).

switching alternatives has stated, "[w]e will never buy another class 5 [circuit] switch again."[191] As of year-end 2003, competing carriers have deployed more than 8,700 packet switches.[192] And while comprehensive data on softswitch deployment are unavailable, many CLECs have reported deploying them.[193]

Compared to circuit switches, softswitches and packet switches are much less expensive and can be deployed more quickly.[194] They are more scalable, and therefore ideal for new entrants.[195] Indeed, even ILECs are now preparing to replace their embedded base of circuit switches with soft switches and packet switches.[196] And as these trends demonstrate, it is now axiomatic that softswitches can be used not only for data services, but for high-quality voice services as well.

2. Circuit-Switched Cable Telephony

Approximately 15 percent of all U.S households are now able to obtain circuit-switched telephony service from their local cable company.[197] Of the households to which service is

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[191] *See* E. Herman, *et al.*, *FCC Staff Urges Industry To Weigh in Soon on Carrier Compensation*, Comm. Daily at 2-3 (Dec. 4, 2003) (quoting Allegiance Telecom CEO Royce Holland).

[192] *See CLEC Report 2004*, Ch. 4 at Table 19. New Paradigm estimates that facilities-based CLECs have deployed 8,800 packet switches as of year-end 2003, of which 56 switches were deployed by Qwest and SBC Telecom.

[193] *See, e.g.*, Choice One News Release, *Choice One Selects Lucent Technologies To Provide Next-Generation Voice Over Internet Protocol (VOIP) Solutions* (Feb. 9, 2004) (Choice One Communications senior vice president Robert Bailey: "The Lucent softswitch solution will enable Choice One to offer new VoIP features to clients over their existing broadband connections."); Level 3 Press Release, *Level 3 Reports First Quarter Results* (Apr. 29, 2004) (Level 3 CEO James Q. Crowe: Level 3 "expect[s] to benefit from the continued migration of voice from traditional circuit-switched services to softswitch-based VoIP services."); V. Vittore, *Nortel Inks MCI Softswitch Deal*, TelephonyOnline.com (June 3, 2003), http://telephonyonline.com/ar/telecom_nortel_inks_mci/ (MCI "has been deploying Nortel's Succession super-class softswitches and Passport Packet voice gateways . . . By 2005, MCI plans to have all of its voice riding over IP."); NewSouth Press Release, *Fort Jackson Chooses NewSouth as Leading Telecom Provider* (Nov. 3, 2003) (NewSouth (now NuVox) "has a fully deployed network, which includes the Tekelec VXi MGC softswitch" and "Cisco packet-based switches").

[194] *See, e.g.*, R. Poe, *Next-Generation Switching Gives Power to Small Players*, America's Network (June 1, 2004) ("Softswitches offer two major advantages over conventional switches: cost and capabilities."); Level 3, *The Level 3 Difference*, http://www.level3.com/userimages/DotCom/pdf/ Level3story_USEng_Global_Letter_forscreen.pdf ("Level 3 developed and patented the first Softswitch, which handles modem calls with an unrivaled 99% call success rate for a fraction of the cost of circuit switching.").

[195] *See, e.g.*, M. Farrell, *et al.*, *All's Quiet on the Cutting Edge*, Multichannel News at 30 (Feb. 23, 2004) ("Time Warner thinks it might need a dozen or so regional soft switches to handle a nationwide rollout."); *Rutledge/Cablevision Presentation* at 42 (noting that its softswitch has a current capacity of 100,000 lines and is "[s]calable and [i]nteroperable as [d]emand [r]equires").

[196] *See, e.g.*, Verizon News Release, *Verizon Selects Nortel Networks To Accelerate Building of Nation's Largest Converged, Packet-Switched Wireline Network Using Voice-Over-IP Technology* (Jan. 7, 2004); V. Vittore, *et al.*, *SBC, Qwest Pursue VoIP Migrations*, Telephony (Dec. 1, 2003).

[197] Comcast, Cox, and Insight reported 16.3 million passed for telephony service as of second-quarter 2004. The total for Cox includes approximately 77,000 homes passed for VoIP telephony in Roanoke. Charter does not report the number of homes passed by circuit-switched telephony; Charter offered voice service to 328,000 homes as of second-quarter 2004. RCN passed 1.4 million homes as of third-quarter 2003, and Knology passed 747,000 homes as of second-quarter 2004; homes passed by these overbuilders may overlap with other cable providers. *See*

available, more than 15 percent actually subscribe.[198] In a number of markets, the penetration rate is much higher – as much as 45 to 55 percent.[199]

Circuit-switched cable telephony could economically be provided much more broadly. The fact that it is available to only about 15 percent of U.S. households reflects the fact that only two of the six major cable operators – Cox and Comcast – have decided to deploy the service to any significant extent, and Comcast to only a limited percentage of its service territory.[200] But the success these two cable operators have had demonstrates that it is economic for all other cable operators to provide circuit-switched cable telephony on a widespread basis as well.

The provision of circuit-switched cable telephony has clearly proven profitable. Cox reports EBITDA margins of over 40 percent on its Digital Telephone service.[201] Comcast has recently informed investors that "we're traveling in excess of a 25% margin in the legacy circuit switch phone business."[202] Both companies report that they have reduced their cost structures in the past year.[203]

Financial Tables *attached to* Comcast Press Release, *Comcast Reports Second Quarter 2004 Results* at 10 (July 28, 2004) (Comcast telephony is available to 9.8 million homes); Financial Results *attached to* Cox Communications News Release, *Cox Communications Announces Second Quarter and Year-to-Date Financial Results for 2004* (July 29, 2004) (Cox telephony is available to 5.5 million homes); Supplemental Information & Quarterly Operating Statistics *attached to* Insight Communications News Release, *Insight Announces Second Quarter 2004 Results* (July 30, 2004) (Insight telephony is available to 733,000 homes); Knology Press Release, *Knology Reports Second Quarter Results* (July 27, 2004) (Knology telephony is available to 747,000 homes); RCN Press Release, *RCN Announces Third Quarter 2003 Results* (Nov. 11, 2003) (RCN telephony is available to 1.4 million homes); Charter Communications News Release, *Charter Reports Second Quarter 2004 Financial and Operating Results* (Aug. 9, 2004) (Charter telephony is available to 328,000 homes); J. Halpern, *et al.*, Bernstein Research Call, *Broadband Update* at Exhibit 1 (Mar. 10, 2004) (approximately 110.5 million households as of 2Q04).

[198] *See June 2004 Local Competition Report* at Table 5.

[199] *See, e.g.*, M. Richtel, *Time Warner To Use Cable Lines To Add Phone to Internet Service*, N.Y. Times (Dec. 9, 2003) (reporting Cox's penetration rates of 45 percent in Omaha, and 55 percent in Orange County).

[200] Comcast passes 40.3 million homes for cable service, 37.3 million homes for cable modem service, but only 9.8 million homes for telephony. In the past year, however, Comcast expanded its telephony homes passed by more than 600,000. *See* R. Bilotti, *et al.*, Morgan Stanley, *Comcast Corporation* at Exhibit 1 (July 28, 2004).

[201] *See, e.g.*, Pat Esser, executive vice president & COO, Cox Communications, presentation accompanying Second Quarter 2004 Earnings Conference Call at 16 (July 29, 2004).

[202] *Q2 2004 Comcast Corporation Earnings Conference Call – Final*, FD (Fair Disclosure) Wire, Transcript 072804at.745 (July 28, 2004) (quoting Comcast COO Steve Burke).

[203] *Comcast Corporation at Wachovia Securities Media & Communications Fixed Income Conference – Final*, FD (Fair Disclosure) Wire, Transcript 041404ax.730 (Apr. 14, 2004) (Comcast Corp. vice president of finance Bill Dordelman: "we are a major telephone provider in the circuit switch environment, frankly larger than the rest of our industry combined. . . we've realigned and repointed the business and the strategy, and now we're at a point where we're profitable. . . . we're hopeful to get back into the mid-twenties type of margin in '04."); *Q1 2004 Comcast Corporation Earnings Conference Call – Final*, FD (Fair Disclosure) Wire, Transcript 04284am.775 (Apr. 28, 2004) (Comcast Corp. co-CFO, EVP & treasurer John Alchin: "Operating cash flow growth reflects…operating improvements in key areas such as…continuing improvement in our cable telephony expense line."); Pat Esser, executive vice president & COO, Cox Communications, presentation accompanying Second Quarter 2004 Earnings Conference Call at 16 (July 29, 2004) ("Profitability continues to improve").

Other cable operators would be able to achieve similar or even superior cost structure. Three of the major cable operators – which pass nearly 65 percent of all U.S. households – are larger than Cox, and would presumably be able to attain even greater economies of scale.[204] Cox and Comcast have successfully provided cable telephony service in the largest MSAs (*e.g.*, Chicago, where Comcast's network passes 3.6 million homes), as well as many smaller ones (*e.g.*, Wichita, where Cox passes approximately 231,000 homes).[205] Other smaller markets include Hartford, Jacksonville, Richmond, and Salt Lake City (by Comcast), and New Orleans, Oklahoma City, Tucson, and Omaha (by Cox).[206] And within these geographic markets, Cox and Comcast do not always serve the densest area. For example, the Comcast telephony offering in the San Francisco MSA is limited to the Fremont area.[207]

There have historically been two principal reasons why other cable operators have chosen not to deploy circuit-switched telephony service on a widespread basis, neither of which calls into question the economic viability of this strategy.[208] The first is that a number of cable operators – including Comcast (before it acquired AT&T Broadband), Time Warner, Adelphia, Charter, and Insight – decided several years ago to wait instead for VoIP technology.[209] As described in § II.A.1 above, these cable operators are now in the process of deploying VoIP service, as is Cox.

A second reason that many cable operators have not aggressively pursued circuit-switched cable telephony is the widespread availability of UNE-P. As analysts have recognized,

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[204] *See* Table 2.

[205] Media Business Corp., *Top 10 MSOs by County* (Mar. 2004).

[206] *See* CED inDepth, *Advanced Services Deployment Handbook* at 14 (Mar. 2004).

[207] *See* Comcast Phone of California, LLC, Schedule Cal. P.U.C. No. 1 § 1.2.

[208] Some cable operators have conducted trials of or deployed circuit-switched service on a limited scale. For example, in July 1997, Cablevision Lightpath began offering Optimum Telephone, a circuit-switched service, to approximately 4,400 households in seven Long Island communities. *See Cablevision Introduces Residential Telephone Service on Long Island*, Business Wire (July 24, 1997). In 2000, with approximately 12,000 subscribers, Cablevision stopped marketing circuit-switched service. Cablevision Systems Corp., Form 10-K (SEC filed Mar. 30, 2001); J. Reif-Cohen, *et al.*, Merrill Lynch Capital Markets, Investext Rpt. No. 8305280, Cablevision Systems Corp. – Company Report at *5 (Dec. 17, 2001). Time Warner began testing telephony over its cable network in Rochester in 1995, where it had installed an AT&T 5ESS switch. *See Time Warner and Tellabs Deliver Cable Telephony*, PR Newswire (Feb. 28, 1995); A. Stewart, *Pushing Out the Frontier*, Communications International at 10 (June 1995). By October 1996, Time Warner served 1,000 residential customers. *See* D. Lieberman, *Time Warner Busy Revising Phone Plans*, USA Today at 1B (Oct. 9, 1996).

[209] *See, e.g.*, *Comcast Holdings Corp at Goldman Sachs Communacopia XII Conference – Final*, FD (Fair Disclosure) Wire, Transcript 093003as.769 (Sept. 30, 2003) (Comcast CEO Brian Roberts: "[W]e got a bonus, if you will, in the AT&T deal. We have a million, 250 thousand telephony customers, the largest provider of cable telephone today. We have a tremendous infrastructure and all the pain and suffering that went into that. One of these days we're going to complete the project in a way that we think is probably more technologically sustainable and hopefully in an economic way and we paid nothing for that platform, in our minds, when we bought the business."); *Q1 2004 Insight Communications Earnings Conference Call – Final*, FD (Fair Disclosure) Wire, Transcript 043004ag.714 (Apr. 30, 2004) (Insight COO and executive vice president Dinesh Jain: "[T]he development of VOIP has so dramatically come along in the last couple of years, and you know, we have four markets launched with Circuit Switch that we are very pleased, having launched those markets, and we are concentrating on those markets, and operating the telephone business. As we look forward . . . our intention is to look at the VOIP platform and see where it makes sense and to launch the VOIP platform in new markets.").

UNE-P "is negative for all companies providing local telephony or planning to enter that business, including cable companies."[210] As a result, "where UNE-P is successful, cable telephony has not been."[211] In the wake of AT&T's decision to stop marketing UNE-P, Cox proclaimed that this "will be very positive for Cox" and "may actually be better news for the MSOs than the RBOCs."[212]

3. Use of CLEC Switches and Unbundled Loops

The Commission's own data indicate that competing carriers were serving approximately 3 million mass-market lines using their own circuit-switches together with unbundled loops at the time of the *Triennial Review*.[213] The vast majority of these mass-market lines were being

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[210] N. Gupta, *et al.*, Salomon Smith Barney, Investext Rpt. No. 7238096, Cable – UNE-P Ruling Has Mixed Impact on Cable – Industry Report at *1 (Feb. 21, 2003). "Cox Communications, in particular, and Comcast . . . are most affected on a longer-term basis." *Id.*

[211] G. Miller, *et al.*, Fulcrum Global Partners LLC, *Wireline Communications: Revising BLS and SBC Estimates Due to AWE Dilution* at 2 (Mar. 10, 2004). *See also id.* at 7 ("Eliminating UNE-P based resale all together would offer incentives to cable companies to pursue such a customer base without the fear that 50 or more local resellers, with little capital requirements, would flood the market."); J. Bazinet, *et al.*, JP Morgan, *The Regulatory Handbook: 2003; The Implications of Pending Regulatory Changes in the Telecom, Media, and Cable Sectors* at 13 (Jan. 16, 2003) ("Investment Thesis #4 – Cable Voice Is an Attractive, But Nascent, Business. We believe the voice business could be positively affected [if] unbundled network element obligations are dropped. If they are, the ILECs will no longer be required to provide their voice network to new competitors entering the market. That would leave more of the market for cable companies, like Cox or Comcast. We think it's likely that these restrictions will be lifted in the next 12-18 months, and this would be positive for cable."); *Louthan/Raymond James Testimony* ("UNE-P has flourished once prices hit a certain threshold; yet we have seen little evidence of the providers' desire to build their own facilities, as they are earning very healthy returns under the current model.").

[212] *Reversal of UNE-P: The Cable Perspective; Cox Communications*, UBS Conference Call with Executives (July 26, 2004) (statements by Cox vice president of marketing David Pugliese).

[213] The Commission's local telephone competition data show that, as of June 2002, there were 4.061 million "UNEs without switching." *See June 2004 Local Competition Report* at Table 4. All but 72,000 of these UNE-L lines were provided using voice-grade analog loops, which the *Triennial Review Order* found "are used to serve customers typically associated with the mass market." *Triennial Review Order* ¶ 197 n.624; *see Triennial Review Order* ¶ 299 & n.865 (BOC data showed that they had provided a total of only 72,000 unbundled high-capacity loops to competing carriers); *UNE Fact Report 2002* at IV-6, Table 2. To the extent that high-capacity lines are included in the counts of "UNEs without switching" reported to the Commission, they are not converted into voice-grade equivalent lines, and therefore are counted the same as voice-grade analog loop. *See* FCC Form 477 Reporting Instructions at 7 ("Line C.II-4: Report lines/wireless channels that you provided to unaffiliated telecommunications carriers under a UNE loop arrangement, where you do *not* provide switching for the line. . . . *Do not* convert any high capacity lines provided under such UNE arrangements into voice-grade equivalent measures.") (emphasis in original).

Of the approximately 4 million lines categorized as "UNEs without switching," we estimate that 71 percent – or 3 million – were provided to mass-market customers. This is based on the fact that SBC reports to the FCC that 71 percent of the unbundled loops it has provided to competitors were provided to serve mass-market customers. *See Selected RBOC Local Telephone Data*, available at http://www.fcc.gov/wcb/iatd/comp.html/ (RBOC_Local Telephone_Dec_2003.xls); *see also* FCC Form 477 Reporting Instructions at 7 ("classify lines as residential and small business if the carrier orders fewer than four (4) voice-grade equivalent lines for its use in serving a particular end user. If such information . . . is not available, . . . estimate a comparable classification based on tariffs or on marketing information, such as demographic information associated with geographic areas where the lines are provided."). The other Bell companies do not report the percentages of unbundled loops that they provide to CLECs that are used to serve mass-market customers.

provided to small business customers, however, and were therefore excluded from the Commission's analysis, which focused solely on residential customers.[214]

The principal explanation for why competing carriers have used their circuit switches to serve millions of small business customers, but few residential customers, is that the revenue opportunities of serving business customers are greater. Retail rates for small business customers exceed residential rates by an average of more than 85 percent, according to the Commission's own data.[215] The cost-side of the equation, by contrast, is basically the same for residential and small business customers, as the Commission has found.[216]

Today, the number of mass-market lines being served through unbundled loops and competitive circuit switches is approximately the same as it was at the time of the *Triennial Review* – roughly 3 million.[217] Data compiled by the Bell companies show that competing carriers are serving these mass-market customers through their own switches together with unbundled loops in at least 137 of the top 150 MSAs, which contain nearly 70 percent of the U.S. population. *See* Table 10. In the top 150 MSAs, at least one or more competing carriers is now serving mass-market customers using their own switch together with unbundled loops in wire centers that account for 83 percent of the access lines in those MSAs.[218] In the top 150 MSAs, competing carriers are serving mass-market customers in 59 percent of the wire centers with 10,000 or more lines, which account for 85 percent of the access lines in those MSAs. *See* Table 10. Competing carriers are serving 58 percent of the wire centers in the top 150 MSAs with 5,000 or more lines, which account for 84 percent of the access lines in those MSAs.

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[214] *See Triennial Review Order* ¶ 440.

[215] *Compare* Ind. Anal. & Tech. Div., WCB, FCC, *Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service* (2004) at Table 1.2 (average residential rate for local service in urban area is $24.75) *with id.* at Table 1.8 (average local rates for businesses with a single local line in urban areas is $46.43); *see Triennial Review Order* ¶ 425 n.1303.

[216] *Triennial Review Order* ¶ 127 ("the cost of serving each [mass-market] customer is low relative to the other customer classes").

[217] *See June 2004 Local Competition Report* at Table 4 & n.213, *supra*.

[218] A number of competing carriers that have deployed circuit switches acknowledge that an MSA properly reflects the scope at which competing carriers enter to serve mass-market customers. *See, e.g.*, Reply Testimony of Professor Nicholas S. Economides on Behalf of AT&T Communications of California, Inc. at 14-15, Rulemaking 95-04-043, Investigation 95-04-044 (CA PUC filed Jan. 16, 2004) ("Except for companies that attempt to serve only niche markets, entry at a limited number of wire centers is uneconomic. Entrants that are not looking for specialized niche markets will need to enter at a significantly larger scale tha[n] the wire center. An efficient CLEC will need to be able to efficiently solicit business in a larger area, such as the MSA."); Reply Testimony of Lawrence E. Strickling Concerning Market Definition Issues on Behalf of Allegiance Telecom of California, Inc. at 6, Rulemaking 95-04-043, Investigation 95-04-044 (CA PUC filed Jan. 16, 2004) ("Certainly, competitive carriers do not enter a city to provide service to mass-market customers in only one exchange or wire center.").

Table 10. Use of Unbundled Loops To Serve Mass-Market Customers in Top 150 MSAs						
	# of MSAs in Top 150 with Mass-Market UNE-L in One or More Wire Centers	**% of Access Lines in Top 150 MSAs in Wire Centers with Mass-Market UNE-L**	**% of Wire Centers in Top 150 MSAs with 5,000 or More Lines that Have Mass-Market UNE-L**	**% of Access Lines in Top 150 MSAs in Wire Centers with 5,000 or More Lines and Mass-Market UNE-L**	**% of Wire Centers in Top 150 MSAs with 10,000 or More Lines That Have Mass-Market UNE-L**	**% of Access Lines in Top 150 MSAs in Wire Centers with 10,000 or More Lines and Mass-Market UNE-L**
Verizon	45	77%	61%	79%	72%	83%
SBC	60	86%	52%	86%	50%	85%
BellSouth	31	87%	64%	87%	59%	86%
Qwest	17	92%	64%	90%	62%	89%
Total	**137**	**83%**	**58%**	**84%**	**59%**	**85%**

III. COMPETITION FOR HIGH-CAPACITY FACILITIES AND SERVICES

The *Triennial Review Order* defines "high-capacity" as "DS1 [1.544 Mbps] and above."[1] As the Commission has recognized, the main users of high-capacity facilities – enterprises and telecommunications carriers – require sophisticated services that produce significant revenues, and are therefore attractive targets for competitive supply.[2] These customers also tend to be geographically concentrated, and can therefore be served very efficiently. For example, approximately 80 percent of the Bell companies' special access revenue is generated in just 18 percent of their wire centers. *See* § III.B.

Competitors have long targeted the deployment of their facilities to meet this highly concentrated demand. Competing providers have deployed an average of nearly 20 networks in each of the top 50 Metropolitan Statistical Areas (MSAs) nationally. *See* § III.A. Based on the limited data available, competitors have deployed fiber in at least 55 percent of the wire centers that account for 80 percent of BOC special access revenues. *See* § III.B. More than half of all BOC wire centers with 5,000 or more business lines are now connected to at least one competitively supplied fiber. *See id.* Within these MSAs and wire centers, competing carriers have further targeted the buildings with the highest concentration of demand for high-capacity services. Competing carriers have deployed tens of thousands of fiber connections directly to office buildings, including the majority of buildings with high estimated telecommunications expenditures. *See* § III.A.

At the locations where fiber has been deployed, it can readily be used to provide high-capacity services to any customer, at any capacity from DS1 on up. *See* § III.C. A single fiber-optic cable typically contains either 72 or 144 separate strands of glass,[3] and a typical "single-mode" strand lit by state-of-the-art lasers can provide up to 10 Gbps of capacity (OC-192).[4] With newly deployed fiber-optic cable, a competing carrier will typically start out activating capacity at the OCn level[5] – far more than any single end user, and even many smaller carriers, can use on their own.[6]

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[1] *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978, ¶ 45 (2003) ("*Triennial Review Order*").

[2] *See, e.g.*, *Triennial Review Order* ¶ 197 n.624 ("The enterprise market is a business customer market of typically medium to large businesses with a high demand for a variety of sophisticated telecommunications services. . . . The record reflects that high-capacity loops, DS1 to OCn, are generally provisioned to enterprise customers.").

[3] *See, e.g.*, Telegeography, *MANs 2003: Metropolitan Area Networks* at 37 (Aug. 2002) ("*Telegeography MANs 2003*") ("Newer network operators lay at least 72 fiber pairs and often install more"); *Triennial Review Order* ¶ 312 n.918 (noting evidence of an "industry average of a 'mere' $1.00 per foot to increase fiber placement from a 72 fiber strand cable to the next standard 144 size fiber strand cable").

[4] *See, e.g.*, *Telegeography MANs 2003* at 67 ("Current-generation lasers can generate ten billion pulses per second – that is, 10 Gbps.").

[5] *See, e.g.*, *Triennial Review Order* ¶ 298 ("When competitive LECs self-deploy fiber they predominantly do so at the OC-n level."); *id.* ¶ 382.

[6] *See, e.g.*, *Triennial Review Order* ¶ 312 ("Once the significant fiber construction cost is incurred, the record reflects that it is relatively easy and inexpensive to install fiber strands in excess of current demand at that time to maximize the use of the conduit and avoid the need to incur duplicate costs to retrench the same location in

But fiber is rarely deployed to serve the telecom needs of a single customer. Fiber-optic capacity is instead "channelized" to carve virtual dedicated circuits of varying bandwidths (from DS1 on up) out of the single physical whole. *See* § III.C. As an economic and technological matter, therefore, competition to deploy fiber depends on the *aggregate* demand at a given location. In any case, competing carriers can – and routinely do – share the costs of deploying fiber, and lease capacity to each other on the fiber networks they deploy. *See* § III.D.

Finally, the geographic scope of competition is not defined by deployment of the fiber alone. Fiber itself has supplanted coaxial cable over most of the length of the networks operated by "cable" operators; many business customers can now obtain high-capacity connections over cable, and operators have been actively extending their networks from residential areas into downtown business districts and office parks. *See* §§ III.D, III.E.2. Fixed wireless services are being used aggressively, now, to extend high-capacity connections to businesses anywhere in the general vicinity of competitive fiber and cable facilities. *See* § III.D. And competitors can readily use the ILEC's tariffed special-access services to fill out any remaining gaps in their coverage. *See* § III.E.2.

Today, competition is thriving in all of the markets in which high-capacity facilities are used. Competing carriers control a third or more of all special access revenues; more than half of the market for large enterprise customers; and approximately three-quarters of the market for high-capacity data services, which now represent the majority of corporate telecom spending. *See* § III.E.2. Competition is likewise thriving in wireless and long-distance markets, where carriers use high-capacity facilities within their networks and to interconnect with ILECs. *See* § III.E.1. The fact that competition is flourishing for all of these various retail services that rely on high-capacity facilities, proves that high-capacity alternatives are now competitively available on a wholesale basis wherever the demand for high-capacity facilities and services exists.

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the future if demand for additional fiber facilities occurs."); Main Brief of Verizon Pennsylvania Inc. and Verizon North Inc., Docket No. I-00030099, at 45 n.132 (PAPUC filed Feb. 17, 2004) (quoting MCI St. 1.0 (Pelcovits Direct Testimony) at 99: "It is true that no carrier would place only enough fiber capacity to serve its existing demand.").

A. Competitive Fiber Networks

Competing providers began deploying fiber networks long before the 1996 Act. By the time of the *Triennial Review*, the Commission found that competitive fiber was available in large and small markets throughout the country.[7] And a number of competing providers have continued to expand their fiber networks since that time.[8]

As of year-end 2003, competing providers had deployed at least one network in 140 of the top 150 MSAs, and an average of 19 networks in each of the top 50 MSAs. *See* Appendix D. These networks consist of approximately 324,000 route miles of fiber. *See* Table 1. Although less than a third of all CLECs separately report the total number of *local* route miles they operate, the eight carriers that do have deployed more than 62,000 local route miles of fiber. *See* Table 1.

Only 16 of the 24 CLECs that report their fiber route miles also provide the number of buildings they serve *directly* on their network – that is, buildings connected to the CLEC's fiber ring with the CLEC's own fiber; these CLECs now report serving approximately 32,000 buildings connected directly to their fiber. *See* Table 1. Even fewer CLECs report the number of buildings they serve *indirectly* on their network – that is, buildings connected to the CLEC's fiber ring through a facility leased from a third party, including ILEC special access. Only four of the 24 CLECs that report their fiber route miles provide such totals, and they report serving 210,000 additional buildings indirectly on their networks.[9]

Many CLECs acknowledge that they now serve a significant percentage of their customers entirely over their own facilities. Time Warner Telecom recently stated that "[t]he majority of our revenue continues to be derived from services provided to our customers exclusively through our own network facilities."[10] MCI told investors in May 2004 that "28% of

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[7] *See, e.g.*, *Triennial Review Order* ¶ 298 ("[C]ompetitive LECs have deployed fiber that enables them to reach customers entirely over their own loop facilities," and have "built fiber loops to buildings that carry a significant portion of the competitive traffic in certain MSAs."); *id.* ¶ 315 ("Competitive LECs have deployed OCn capacity to some commercial buildings nationwide, including Tier II and Tier III markets."); *id.* ¶ 360 ("[C]ompetitive DS1, DS3, and dark fiber transport facilities are available on a wholesale basis in some areas, and . . . competing carriers have deployed their own transport networks in some areas."); *id.* ¶ 378 ("The record indicates that competing carriers have deployed significant amounts of fiber transport facilities to serve local markets."); *id.* ¶ 398 ("There is no disagreement among the parties that alternative transport facilities have been deployed and are available as alternatives to unbundled transport in some locations").

[8] Only two CLECs (AT&T and Time Warner Telecom) publicly reported their *local* route miles for each of the past two years, and the totals for both increased – by 2,500 and 1,075 route miles, respectively. Of the CLECs that reported the buildings served directly on their networks for both 2002 and 2003, four reported increases during that time: Buckeye Telesystem (+100); Cablevision Lightpath (+220); McLeodUSA (+11); and Time Warner Telecom (+313).

[9] *See* Reply Comments of AT&T Corp., RM-10593, at 12-13 (FCC filed Jan. 23, 2003); ICG Communications, Inc., Form 10-Q (SEC filed Aug. 16, 2004); KMC Telecom Press Release, *KMC Telecom Successfully Completes Financial Restructuring* (July 29, 2003); KMC Telecom, *Wholesale Services*, http://www.kmctelecom.com/Wholesale/; Time Warner Telecom Press Release, *Time Warner Telecom Announces Second Quarter 2004 Results* (Aug. 4, 2004).

[10] Time Warner Telecom Press Release, *Time Warner Telecom Not Impacted by UNE Ruling* (June 10, 2004) (quoting Paul Jones, SVP, General Counsel and Regulatory Policy).

its high-capacity circuits were on-net in the U.S."[11] AT&T told investors two years ago that AT&T was already providing "over 20 percent . . . of our T1-equivalent services . . . on net and we're growing that every day."[12] One analyst more recently estimated that AT&T was now earning at least a quarter of its high-capacity revenues entirely over its network.[13]

Table 1. Competitive Fiber Networks

	Markets				
	MSAs	**States**	**Local Route Miles**	**Total Route Miles***	**Buildings Connected Directly To CLEC's Fiber Network Using CLEC Fiber**
AT&T	70	38	21,000		6,400
Buckeye Telesystem	1		n/a	250	900
Cablevision Lightpath	n/a	3	n/a	2,700	1,620
Cavalier	8	5, DC	n/a	2,000	n/a
Choice One	23	11	1,429		n/a
Cinergy	n/a		n/a	1,000	n/a
Comcast Business	n/a	a	n/a	1,600	265
Cox Communications	23	13	n/a	9,500	6,600
Grande Comms.	5	1	n/a	3,100	n/a
ICG Communications	22	9	2,166		913
Integra Telecom	n/a	5	n/a	85	n/a
ITC^DeltaCom	19	5	n/a	14,448	n/a
KMC Telecom	35 (cities)	16	n/a	2,400	1,700
Level 3	25	20	4,000		792
MCI	63	35, DC	9,000		n/a
McLeodUSA	40	23	n/a	5,000**	1,500
NTS Communications	5	1	n/a	7,000	50
Qwest	24	13, DC	n/a	1,800	260
SIGECOM	1	1	n/a	880	n/a
TelCove	48	22	8,700+		2,500
Time Warner Telecom	41	20	12,247		4,576
XO	34	25, DC	n/a	23,800	2,435
Xspedius	35	18, DC	3,500		684
Yipes	10	7, DC	n/a	21,000	474
Other***			n/a	165,758	
		Totals	**62,042**	**323,963**	**31,669**

Data reflect totals self-reported by CLECs where available, and New Paradigm Resources Group's *2004 CLEC Report* in all other cases.
* May include long-haul route miles in addition to local route miles.
** CLEC-reported totals were unavailable for year-end 2003, so data from a previously reported period were used.
*** Includes competing providers not individually listed in table, as reported by New Paradigm Resources Group.
Sources: See Appendix H.

[11] J. Hodulik, *et al.*, UBS, *Long Distance Update: No Sign of Improvement in Business Market* at 5 (May 28, 2004) (quoting MCI investor conference call).

[12] David Dorman, President, AT&T, *Presentation at the Goldman Sachs Communacopia Conference*, Transcript of Remarks (Oct. 2, 2002).

[13] *See* J. Hodulik, *et al.*, UBS, *Paying to Play: How Access Charges Determine Winners and Losers in Telecom Services* at 27 (Apr. 2, 2004).

A separate group of fiber wholesalers – companies that originally deployed networks to serve other carriers, including both CLECs and ILECs – have likewise deployed extensive fiber networks.[14] Collectively, these carriers now operate at least 19,000 route miles, connecting to at least 3,000 buildings directly with their fiber, with at least 12,000 additional buildings readily in reach ("near net"), in at least 40 MSAs. *See* Table 2. At least 10 utilities also operate local fiber networks and sell capacity wholesale in at least 40 MSAs. *See* Table 3. A number of these wholesale fiber suppliers have likewise expanded their networks since the *Triennial Review*.[15]

Table 2. Fiber Wholesalers

	MSAs Served	**Network Miles**	**Buildings Connected Directly to Network with Competitive Fiber**
AboveNet	Atlanta, Baltimore, Boston, Chicago, Dallas, Houston, Los Angeles, New York, Philadelphia, San Francisco, Seattle, Washington	1.4 million metro fiber miles	1,000+
American Fiber Systems	Atlanta, Cleveland, Kansas City, Minneapolis/St. Paul, Nashville and Salt Lake City	440+ route miles	400+ (12,000+ on-net/ near-net)
City Signal	Camden, Cleveland, Norfolk, Philadelphia, Richmond and Wilmington	900+ route miles	n/a
Fibertech Networks	Albany, Binghamton, Bridgeport, Buffalo, Columbus, Hartford, Indianapolis, New Haven, Pittsburgh, Providence, Rochester, Springfield, MA, Stamford, CT, Syracuse, Wilmington, DE and Worcester (Future networks planned in 47 markets)	1,700+ route miles (avg. of 120/market)	Access to 164,000 business lines per market
LightCore	Arkansas, Illinois, Iowa, Kansas, Louisiana, Michigan, Missouri, Nebraska, Oklahoma, Tennessee and Texas	10,000+ route miles	n/a
Looking Glass Networks	Atlanta, Baltimore, Chicago, Dallas, Houston, Los Angeles, New York, Philadelphia, San Francisco, San Jose, Seattle and Washington	390 route miles (Atl., Chi., Dal., LA, NY only)	400+
NEESCom/ Gridcom	Albany, Boston, Providence, Springfield and Worcester, MA	700+ route miles	177 (Worcester only)
Northeast Optic Network (NEON)	Albany, Baltimore, Boston, Hartford, Manchester/Nashua, New York, Portland, Portsmouth, Providence, Springfield, Stamford, Washington and Worcester, MA	4,600 route miles	177

[14] *See Triennial Review Order* ¶ 42.

[15] *See, e.g.*, AboveNet Press Release, *AboveNet's Aggressive Expansion of its Footprint and Product Line Results in Dramatic Increase in Customer Access* (Nov. 11, 2003) (reporting "dramatic increase in customer access as a result of its yearlong initiative to expand both its footprint and product line"); Fibertech Press Release, *Fibertech Networks Enters Two New Markets* (Feb. 24, 2004) (announcing "plans to build networks in metropolitan Wilmington, Delaware, and Stamford, Connecticut . . . based on our success in signing up new customers"); LightCore Press Release, *LightCore Expands Reach in Arkansas, Illinois, Missouri; Fiber Network Now Spans 10,000 Miles in Central U.S.* (Dec. 31, 2003) (announcing that "fiber optic network expanded to more than 10,000 route miles in the Central United States . . . [with the addition of] more than 1,400 route miles of lit fiber in Arkansas, Illinois and Missouri."); OnFiber Press Release, *OnFiber Expands Into Boston and Sacramento* (June 17, 2003) (announcing "expansion of its service offerings into the Boston and Sacramento markets."); Con Edison Communications Press Release, *Con Edison Communications Increases Momentum* (Aug. 8, 2003) ("CEC's customer base has grown more than 125 percent during the first half of 2003. These new customers have stimulated the expansion of CEC's buildings served by 20 percent during the same period.").

Table 2. Fiber Wholesalers			
OnFiber	Atlanta, Boston, Chicago, Dallas, Denver, Houston, Los Angeles, New York City, Miami, Philadelphia, Phoenix, Portland, Sacramento, San Francisco, Seattle and Washington	710+ route miles (Atl., Bos., Chi., Dal., LA, NY, Pho. only)	1,000
Sources: See Appendix H.			

Table 3. Utilities That Wholesale Local Fiber			
	MSAs Served	**Network Miles**	**Buildings Served**
Con Edison Communications	New York City	380+ route miles	"[W]ithin 2 city blocks of 80% of Manhattan commercial real estate," with connections to over 175 buildings
Progress Telecom	Atlanta, Charlotte, Daytona Beach, Durham, Fayetteville, Ft. Myers, Gainesville, Greensboro, Greenville, Jacksonville, Miami/Ft. Lauderdale, Melbourne, New York, Raleigh, Richmond, Rocky Mount, Ocala, Orlando, Tallahassee, Tampa/St. Petersburg, Washington, DC, Wilmington, NC, Winston-Salem, Winter Haven	8,524 route miles	n/a
PPL Telcom	Allentown, Baltimore, Harrisburg, Lancaster, New York, Philadelphia, Pittsburgh, Reading, Scranton/ Wilkes-Barre, Williamsport, Washington	2,500 route miles (1,000 local, 1,500 regional)	"Metropolitan networks feature deep fiber penetration . . . fiber passes within half a mile of over 100,000 business locations."
Edison Carrier Solutions	Los Angeles, Riverside/San Bernardino	2,500 route miles	n/a
El Paso Global Networks	Austin, Dallas/Ft. Worth, Houston, San Antonio	n/a	n/a
FPL FiberNet	Jacksonville, Miami/Ft. Lauderdale, Orlando, Tampa/St. Petersburg	2,500+ route miles	Reaches "2.2 million business lines in the state" of Florida
Lafayette Utilities System	Lafayette, LA	65 route miles	n/a
Southern Telecom	Atlanta, Jacksonville	1,200 route miles	60 buildings in downtown Atlanta
AGL Networks	Atlanta, Phoenix	235 route miles	"installs more than 50,000 laterals and 750 miles of conduit per year"
Sources: *See* Appendix H.			

In any market in which a competing carrier deploys fiber, it typically connects that fiber to the incumbent carrier's network, by collocating transmission equipment in at least one of the ILEC's central offices. *See* Table 6, *infra*.[16] Fiber-based collocation accordingly supplies a straightforward and reliable indicator of the presence of competitive fiber. The Bell companies have compiled reliable data on where CLECs have obtained fiber-based collocation by performing physical inspections of thousands of central offices, and from reviewing billing records where CLECs have ordered such collocation.

[16] *See also, e.g.*, *Triennial Review Order* ¶ 370 ("When carriers self-deploy transport facilities, they typically deploy fiber rings that may connect several incumbent LEC central offices in a market.").

These data show that one or more competing carriers have obtained fiber-based collocation in approximately 16 percent of the approximately 9,900 wire centers served by the Bell companies. *See* Table 4. These wire centers contain 47 percent of the Bell companies' total lines, and 55 percent of their total business lines. *See id.* In large metropolitan areas the totals are even higher. For example, in the 25 largest MSAs served by BellSouth, SBC, and Verizon (and seven of the largest MSAs served by Qwest), an average of one or more competing carriers have obtained fiber-based collocation in 33 percent of the wire centers served by the Bell company in those MSAs (containing 59 percent of all access lines, and 68 percent of all business lines within those MSAs). *See* Appendix E.

Table 4. Competitive Fiber-Based Collocation

	Percentage of Wire Centers and Access Lines Served by One or More Fiber-Based CLEC Collocation Nodes			
	# of Wire Centers	**% of All Bus. Lines**	**% of Total Lines**	**% of All WCs**
Verizon	632	55%	44%	13%
SBC	487	51%	44%	15%
BellSouth	313	61%	53%	20%
Qwest*	153	84%	79%	58%
Total	**1,585**	**55%**	**47%**	**16%**

*For Qwest, percentages reflect data for only the seven Qwest MSAs for which data were available.

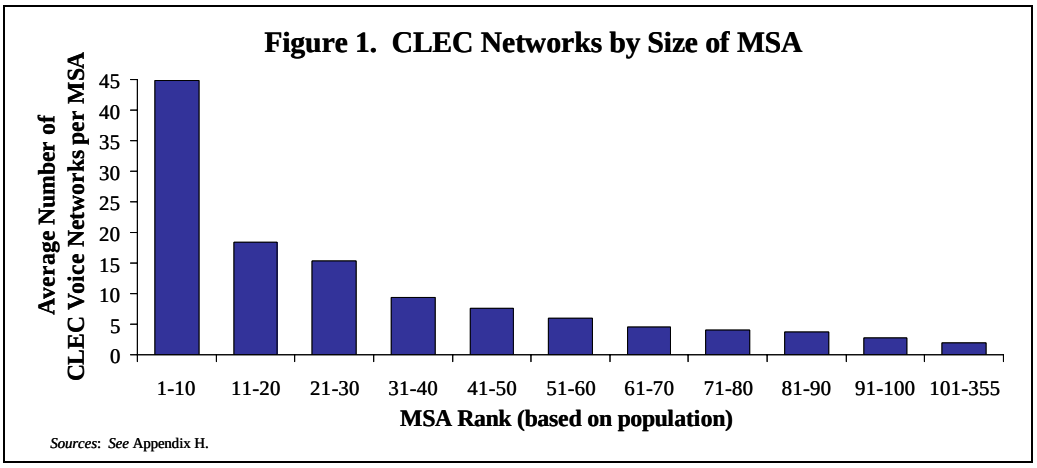
B. Competitive Fiber Is Concentrated Where Demand Exists

The markets served by competitive fiber networks have been carefully chosen to reach the most potential customers with the fewest miles of fiber.[17] Large business customers and carriers themselves are highly concentrated in large urban areas.[18] Just four MSAs – New York, San Francisco, Washington, D.C., and Los Angeles – generate some 40 percent of all data revenues nationwide.[19] The number of separate CLEC networks in an MSA increases in proportion to the size of the MSA. *See* Figure 1.

[17] Teligent estimates that the 31,000 buildings served by competitive fiber contain 35 percent of the 57 million nationwide business lines. *See* J. Continenza, President and CEO, Teligent, presentation before the Comptel/ASCENT Summer Showcase, San Francisco, CA (June 2003).

[18] *See, e.g.*, Ex Parte Letter from Joan Marsh, AT&T, to Marlene Dortch, FCC, CC Docket Nos. 01-338, 96-98, 98-147, at 2 (Jan. 14, 2003) (estimating that only about 50,000 to 60,000 locations nationwide generate enough traffic to justify high-capacity facilities); Reply Comments of WorldCom at 130, CC Docket Nos. 01-338, 96-98, 98-147 (FCC filed July 17, 2002) ("[M]any of the buildings to which it is economical for competitive LECs to build are located in the same central business districts that are most attractive to collocators."); Z-Tel Technologies, Inc., Form 8-K at 5 (SEC filed July 27, 2004) (If a CLEC "focus[es] on urban areas with high CLEC and national carrier buildouts," it can "avoid having to use" high-capacity facilities from a Bell company.).

[19] *See Triennial Review Order* ¶ 298 n.858.



Within the large MSAs, it has been equally easy to target all the key wire centers, and all of the key large points of traffic aggregation.[20] Today, 80 percent of BellSouth's, SBC's, and Verizon's special access revenues are generated in approximately 18 percent of their wire centers. *See* Table 5. One or more competing carriers have obtained fiber-based collocation in 55 percent of the wire centers that make up this total. *See id.*[21]

Table 5. Competitive Fiber Is Concentrated Where Demand Exists

	% of BOC's Special Access Revenue . . .	Contained in X% of BOC's Wire Centers	% of those Wire Centers with Fiber-Based Collocation
Verizon	80%	12%	58%
SBC*	80%	28%	47%
BellSouth	80%	17%	78%
Total	**80%**	**18%**	**55%**

*SBC data exclude OC-n special access revenue. Special access revenue generated in remotes are only reflected in the SBC total.

The vast majority of competitive fiber networks reach more than one ILEC wire center, the CLEC's own local switch, the offices of one or more interexchange carriers, carrier hotels for data and Internet services, and numerous multi-tenant office and other private buildings.[22] CLECs themselves publicize this fact. *See* Table 6. A competing carrier is, of course, able to route traffic from any ILEC wire center it reaches to any point on its own network – competitive

[20] *See, e.g.*, *Triennial Review Order* ¶ 298 (recognizing that a small number of buildings in certain MSAs generate "a significant portion of the competitive traffic in [those] MSAs."); Lehman Brothers and McKinsey & Co., *The Future of Metropolitan Area Networks* at 8 (Aug. 24, 2001) (estimating that only 200 to 300 out of 15,000 multi-tenant units in a typical Tier-One MSA generate 80 percent of the data revenues in that MSA).

[21] In Qwest's region, at least 60 percent of its special access revenues are generated in just 172 wire centers with fiber-based collocation, which make up 14 percent of Qwest's total wire centers.

[22] *See, e.g.*, *Triennial Review Order* ¶¶ 45, 298 & n.856, 361, 367 & nn.1122, 370.

fiber networks are continuous, self-connected structures, most typically a core ring with radial links extending out like tentacles from the ring.[23]

Table 6. Competitive Fiber Connects to All Major Traffic Aggregation Points

CLECs	
Cablevision	"[M]ore than 50 hubs in the [New York metro] areas' major carrier hotels."
Grande Comms.	"[M]ost Carrier POPs, major ILEC central offices, carrier hotels, central/suburban business centers, data centers, co-location facilities and CLECs."
ITC^DeltaCom	"[I]nterconnections with multiple CAPS in many of our transport POP locations."
KMC Telecom	"[I]nterconnects with major central offices and carrier points of presence (POPs)."
Level 3	"[M]etro fiber connects key traffic aggregation points."
XO	"[D]irect paths to all other major Network Service Providers."
Yipes	"[M]ultiple peering points, through multiple interexchange carriers."
Wholesale Fiber Providers	
AboveNet	"[D]irect access to carrier hotels, data centers and key commercial office buildings."
American Fiber Systems	"ILEC and CLEC central offices; ISP and ASP facilities; Interexchange 'carrier hotels;' Wireless providers and cable company head ends."
City Signal	"Central Offices, Carrier Hotels, Data Centers . . . central business districts and suburban office parks."
Fibertech	"[C]onnections to virtually all central offices, POPs and data centers."
LightCore	"[M]ajor bandwidth aggregation points such as serving wire centers, IXC POPs and neutral co-location facilities"
Looking Glass Networks	"[C]onnections to major data aggregation facilities . . . and access to IXC, ISP, ILEC and CLEC locations as well as Web hosting facilities and data centers."
NEESCom/ Gridcom	"Strategic routing past prime office buildings, industrial parks, IXC POPs"
NEON	"[K]ey central offices, tandems, and carrier hotels.".
OnFiber	"[C]onnectivity to data centers, carrier hotels, and enterprise businesses."
Utilities	
Con Edison Communications	"CEC's New York City metro area network . . . interconnects over 100 commercial buildings, all major carrier Points-of-Presence (POPs) and many of the Verizon Central Offices."
Progress Telecom	"[H]igh-speed data connectivity between data centers and carrier hotels."
PPL Telcom	"Numerous CO, Peering, and Carrier Hotel collocates."
Edison Carrier Solutions	"Connectivity to carrier points-of-presence, carrier hotels, data centers, tandems and end-offices."
FPL Fibernet	"[C]onnectivity to more central offices, carrier hotels and international cable-heads than any other fiber wholesaler in the state"
Lafayette Util. Syst.	"[D]irect connections to Tier 1 providers."
Southern Telecom	"[D]irect connectivity to major carrier hotels . . . direct access to the AT&T Super Node."
AGL Networks	"Atlanta's large carrier hotels, IXCs and LSOs." "[A]ccessibility to the main COs, IXCs, and carrier hotels . . . of Phoenix and Tempe."
Sources: *See* Appendix H.	

[23] *See*, *e.g.*, MCI Inc., Form 10-K (SEC filed Apr. 29, 2004) (MCI's "local networks are constructed using closed-loop self-healing fiber rings."); Looking Glass Networks, *Our Network – Architecture*, http://www.lglass.net/network/architecture.jsp ("[E]ach Looking Glass network ring uses a star topology where every building on the network is physically connected to a central node site via diverse paths.").

C. Availability of High-Capacity Services over Competitive Fiber

The availability of high-capacity services over competitive fiber is determined by the proximity of competitive fiber to any given location, not by the bandwidth required by any individual customer, or subset of customers, along the route. If a single large customer in a building requires enough capacity to spur deployment of competitive fiber to a building, all the other tenants can buy competitive capacity in smaller increments from the same provider. Indeed, no one, very large customer is required at all, so long as the bandwidth requirements of multiple users can be economically aggregated. Subdividing the bandwidth offered by a fiber-optic cable isn't the exception, it's the norm.[24]

Thus, fiber-optic capacity is routinely "channelized" – SONET-based "add/drop" multiplexers and demultiplexers at each end of the glass simply carve virtual dedicated circuits of varying bandwidths out of the single physical whole.[25] This hardware is supplied in competitive markets and is relatively cheap compared to the cost of laying the cable;[26] the price of the hardware continues to drop rapidly;[27] and some customers provide their own add/drop multiplexers.[28] Many competitive carriers routinely deploy multiplexing equipment capable of

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[24] *See, e.g.*, Cisco, *Introduction to DWDM for Metropolitan Networks* at 1-5, http://www.cisco.com/univercd/cc/td/doc/product/mels/dwdm/dwdm_fns.pdf ("Using wavelength division multiplexing (WDM) technology several wavelengths, or light colors, can simultaneously multiplex signals of 2.5 to 40 Gbps each over a strand of fiber. Without having to lay new fiber, the effective capacity of existing fiber plant can routinely be increased by a factor of 16 or 32."); American Fiber Systems, *Technology*, http://americanfibersystems.com/technology.htm ("[S]eparate signals can be transmitted via separate colors (lambdas) over the same pair of fibers."); R. Koslowsky, Cisco, *Multiservice Switching Platforms Enable Further Evolution of the Optical Network*, Fiberoptic Product News (May 1, 2003) (The use of multiservice switching platforms with fiber "allows effective aggregation of all high-capacity traffic of smaller enterprises onto the interoffice ring" and provides "the ability to aggregate diverse traffic types, efficiently pack the associated optical transport circuits, and switch this traffic to TDM, ATM, and/or packet routers and switches.").

[25] *See, e.g.*, *Telegeography MANs 2003* at 73 (on every node in a SONET network, multiplexers are used to convert optical signals into electrical ones); AT&T, *AT&T SONET and Optical Private Line Services*, http://www.business.att.com/products/optiondetails.jsp?productId=sonet&option=sonet_ioc ("Local Channel circuit Multiplexing Office Function . . . allows for channelization and an economical way to separate and transmit lower-capacity DS1, DS3, OC3 and OC12 signals."); AT&T Labs Research Press Release, *AT&T Deploys Nationwide Intelligent Optical Network* (Feb. 11, 2002) (announcing "nationwide deployment of new technology" that enables "automatic provisioning . . . and private-line services, often referred to as bandwidth-on-demand or point-and-click provisioning . . . at a variety of bit-rate speeds (from 1.5 Mbps to 10 Gbps, and Gigabit Ethernet)."); *Triennial Review Order* ¶¶ 372, 298 & nn.859-860.

[26] *See, e.g.*, *Telegeography MANs 2003* at 82-83 & Fig. 1.

[27] *See, e.g.*, M. Arden, *KMI Predicts More Fiber Gear Contracts*, Fiber Optic News (Sept. 29, 2003) ("As service providers look to evolve their networks to more intelligent systems, equipment manufacturers will see an increase in spending on optical add-drop multiplexers (OADMs), optical cross-connects (OXCs), next-gen SONET-SDH transmission equipment and similar advanced networking gear. Much of this is due to a marked drop in equipment prices and fiber prices.").

[28] *See, e.g.*, Fibertech Networks Press Release, *Fibertech Networks Completes Providence, R.I. Fiber Optic Network* (Apr. 28, 2003) ("In addition to communications carriers, Fibertech is connecting enterprise customers including financial services, health care, education and government agencies, looking to manage their own network facilities. The company brings 'dark' fiber optic cables directly to local business locations and the customer connects their own electronics to 'light' the fibers on the network."); L. Wirbel, *Do-It-Yourself Nets Open Up to Optical*, Electronic Engineering Times (Dec. 15, 2003) ("Some Fortune 500 companies are leasing or buying the

providing services from DS1 on up as part of their typical set-up in a collocation arrangement in an ILEC's central office. *See* Table 7.[29] Wherever competitive fiber itself is at hand, therefore, high-capacity services can be provided competitively too, in every standard increment. Likewise, these facilities can be used to provide any kind of voice or data service, and CLECs are in fact using their networks to provide a wide variety of local services. *See* Table 8.

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dark fiber deployed in many cities by now-bankrupt carriers, and installing their own optical-networking equipment, ranging from simple Gigabit Ethernet switches used as serial interconnect to complex arrays of optical cross-connects and optical add-drop multiplexers.").

[29] The information contained in Table 7 is based on competing carrier's own statements regarding their service offerings, which typically do not distinguish between individual markets. It is therefore reasonable to assume that these offerings are available in all the MSAs and states in which competing carriers operate fiber networks, which are indicated in Table 1 and Appendix D.

Table 7. High-Capacity Service Offerings over Competitive Fiber	
AT&T	"AT&T Local Private Line Services are delivered over the AT&T Local Service SONET backbone infrastructure . . . and can be provisioned at the following speeds: **DS-1/DS-3, OC-3c, OC-12c, STM-1, STM-4, OC-48c, OC-192c and Ethernet (50 Mbps, 150 Mbps, 300 Mbps, 600 Mbps and 1 Gbps)**."
MCI	"MCI's local network facilities are totally separate from your LEC's facilities (including building access) . . . MCI . . . offers local service over its own network facilities" "**DS-0 . . . DS-1 (1.544 Mbps), and DS-3 (44.736 Mbps) . . . OC-3c (155.520 Mbps), OC-12c (622 Mbps), and OC-48c (2.5 Gbps)**"
Qwest	"Qwest Metro Private Line is available in SONET metropolitan area networks (MANs) in 27 United States metropolitan statistical areas (MSA)," over the "Qwest all fiber synchronous optical network." Service is offered at "speeds ranging from **DS-1 (1.544 Mbps) to OC-48 (2.4 Gbps)** for on-net to on-net connectivity."
Cox	Cox offers private line services "[d]elivered over Cox Business Services' fiber-optic-based network," at speeds of **DS-1, DS-3, OC-3 and up.**
XO	XO offers private line services at speeds ranging from "**DS-1 to OC-x**," over its "extensive intercity and metropolitan network."
Time Warner Telecom	"Time Warner Telecom offers custom solutions with end-to-end network connectivity," using its "expansive local footprint and nationwide IP Backbone," at "transmission speeds from **1.5 Mbps to 10 Gbps**."
Level 3	"(3)Link Metro Private Line service is a dedicated, point-to-point, protected metro transport service offered at line rates of **DS-3, OC-3, STM-1, OC-12/12c, STM-4/4c, and OC-48/48c**."
ITC^DeltaCom	ITC^DeltaCom offers "dedicated Internet access – from **64K to Gigabit and beyond**," over a "14,488 mile fiber optic network feature[ing] 236 Points of Presence (POPs) for reliable access."
ICG	"Special Access can carry voice, data, and/or video traffic at **DS-1, DS-3 and OC-N** capacities . . . [w]ith all locations on the ICG network."
KMC Telecom	KMC offers data services that "operate over the KMC IntraCity SONET Fiber Ring," at speeds from **DS-0 to OC-n**.
McLeod	"Dedicated Internet access at a variety of speeds, either T-1 or DS3, ranging from **128 Kbps to 45 Mbps**, on the McLeodUSA advanced network."
Lightpath	"Lightpath offers **standard T-1 access through enterprise-scale OC-12** floodgates, delivering end-to-end service your company can count on," all over "Lightpath's fiber optic backbone."
NTS	"NTS offers dedicated point-to-point and point-to-multipoint circuits at speeds ranging from **56Kbs to OC192** level connectivity. These services are available domestically on our own network."
Grande Comms.	Grande offers metro network capacity at **DS-x, OC-n** and Wavelength speeds, over its own "robust optical network comprised of state-of-the-art SONET ring technology."
Comcast Business	Comcast offers "[s]ymmetrical dedicated Internet bandwidth configurable **from 5Mbps to 1 Gbps** in 1 Mbps increments," all over Comcast's "extensive fiber network."
Buckeye Telesystem	Buckeye Telesystem offers dedicated access services at "capacities ranging from [] **DS-1** (1.544 Mbps or 24 voice-grade lines) level **to OC-48** (2.4 Gbps or 32,256 voice-grade lines)" over its own network infrastructure "made of redundant SONET rings."
SIGECOM	"Utilizing SIGECOM's state-of-the-art fiber optic network, SIGECOM Enterprise Solutions can connect your business to the Internet at **1.54 Mbps (T1), 5 Mbps, 10 Mbps, or 45 Mbps.**"
AboveNet	"AboveNet connects your corporate Ethernet LAN from your office to our global IP backbone using gigabit Ethernet connections over private fiber . . . in **1Mbps increments" up to gigabit levels**.
LightCore	"LightCore offers dedicated point-to-point private line services in bandwidth increments from **DS-1 to OC-192**," all over "one of the most extensive fiber optic networks in the Central U.S."
Looking Glass Networks	"Our end-to-end, redundant networks offer the full spectrum of SONET/SDH, Ethernet and Wavelength services on our flexible, application-neutral optical platforms – speeds ranging from **1.544 Mbps to 10 Gbps**."
Northeast Optic Network (NEON)	"NEON Communications offers a regional network supporting long-haul and metro SONET private lines" at speeds ranging from **DS-3 to OC-192**.
OnFiber	"Available in point-to-point or point-to-multipoint configurations, OnFiber SONET services are designed to meet the needs of customers with bandwidth requirements of **DS-3 (45Mbps) to OC-192 (10 Gbps)**," all "on the OnFiber all-optical metro networks."
Sources: *See* Appendix H.	

Table 8. CLECs Use Their Networks To Provide *Local* Services	
AT&T	"AT&T satisfies business customers' Local Voice needs with integrated, end-to-end networking solutions that deliver a differentiated customer experience through convenience, value, and reliability." "AT&T Local Private Line Services are delivered over the AT&T Local Service SONET backbone infrastructure. AT&T can establish a point-to-point connection from your premise to a carrier's POP, to non-AT&T InterExchange carrier, to your disaster recovery center or even to your ISP for Internet access."
MCI	MCI "offers local service over its own network facilities." The "local offering within MCI Business Services provides all the features you have come to expect from a world-class provider of local service. Be it local circuits to connect to your PBX or hybrid systems, or ISDN-PRI trunks to facilitate delivery of videoconferencing and Internet service, MCI Business Services now provides the last and most critical mile of network connection: local dial tone service."
Cox	Cox offers "a variety of local services for businesses of all sizes . . . our self-healing ring-in-ring SONET architecture provides a dependable, crystal-clear connection – with customer service that's prompt and local."
XO	"Whatever your local service needs, XO has them covered. Whether your business has one location in a single market or many offices across the nation, XO makes it simple for you to buy local services. That's because XO offers standard product features across all of our markets, along with standard product names and functionality."
Time Warner Telecom	"Time Warner Telecom [] offers business customers a 'real' choice for local telephone service. We provide a variety of switched services for your local voice, data, and video transport needs. . . . State-of-the-art digital switches route communications traffic quickly and efficiently over our own leading-edge, SONET- based fiber optic networks."
Level 3	"(3)Tone Business delivers local and long-distance business voice services with easy-to-use management tools that make business communication more versatile, convenient, and efficient."
ITC^ DeltaCom	"At ITC^DeltaCom, we offer a variety of custom-fit products that can make your local service more cost-efficient and easier to manage. What's more, because we're a facilities-based, full-service telecommunications provider, we can be your single point of contact for installation and customer service."
KMC Telecom	KMC offers "several types of local service, including KMC Business Line Service with either a Basic Business Line (Flat Rate and Measured) or a Basic Business Line with Hunting (Flat Rate and Measured). . . . Our state-of-the-art fiber optic networks ensure clarity and dependability of your service."
McLeod	"The McLeodUSA Value Preferred Select Package is a comprehensive local service package, with the flexibility to add the features your business requires, at an economical price."
Lightpath	"Lightpath offers a comprehensive array of voice services—local, public switched, plus private and advanced networking features—on both local and long distance levels. Lightpath's voice telecommunications services allow businesses of all sizes, from single-site to multi-site corporations, to use the power of a network that is all-digital and completely fiber optic."
NTS	"NTS's facilities-based local dial tone for businesses is nothing short of amazing. After more than 100 years of being forced to use the same telephone company for all of your local dial tone needs, NTS now offers you the choice to use an alternative provider for your local telephone service."
Grande Comms.	Grande allows you to "[c]onnect to the world through [its] local and long-distance telephone with the latest in digital technology," provided over its "highly reliable, fiber-rich network."
Comcast Commercial	"Comcast Business Communications supports two powerful levels of local service (Digital Local Trunk and ISDN PRI) delivered over a broadband optical network."
Sources: See Appendix H.	

The Commission itself has found that fiber wholesalers routinely offer capacity in single-DS3 increments.[30] As of early 2003, the Commission felt it still had insufficient evidence of subdivision down to single-DS1 increments, but predicted that this would occur.[31] Many

[30] *See Triennial Review Order* ¶ 387 ("The record indicates that competitive transport facilities exist in a number of areas and are often being made available on a wholesale basis at the DS3 level.").

[31] *See Triennial Review Order* ¶ 392. The Commission's principal support for doubting that this was already occurring was the 2002 declaration of the director of government affairs of a single CLEC (KMC Telecom), who stated that his company had not yet developed "the necessary back offices systems to support a wholesale transport offering to other CLECs," because it did not have "have the capital budget" to do so. *See* KMC Duke Aff. ¶ 13, *attached to* Initial Comments of NuVox Inc., KMC Telecom, Inc., E-Spire Communications, Inc., TDS

wholesalers are certainly doing just that today. Operators of competitive fiber networks now routinely offer high-capacity services over those networks, on a wholesale basis, from DS1 (1.54 Mbps) all the way up to OC-12 (622 Mbps) and above. *See* Table 9. The ILECs certainly offer DS1 service by providing virtual channels directly over their own glass wherever the glass is at hand.[32]

Table 9. High-Capacity *Wholesale* Services Offered by Competitive Fiber Suppliers

	Wholesale Service	**Capacities**
AT&T	"AT&T **Wholesale Services** offers . . . an array of Local . . . Dedicated Private Line & SONET services from single channel to OC192 (Wavelength) services."	"single channel to OC192"
MCI	"MCI offers a wide range of **wholesale data products**" including "Metro Private Line Services [which] offer point-to-point or point-to-multipoint service between customer-designated locations for voice, data, video."	n/a
Cox	"Cox **Carrier Services** utilizes our local fiber backbone to deliver bandwidth speeds up to OC-48."	"DS-1, DS-3, OC-3 and OC-12 . . . OC-48"
XO	"XO **Carrier Private Line services** provide high-speed, dedicated point-to-point connectivity for voice, data and video applications."	"from DS-1 to OC-n"
Time Warner Telecom	"Time Warner Telecom is committed to serving the needs of **carriers and service providers**. . . . [S]ervices for carriers include: . . . Dedicated High Capacity Services"	"DS1/DS3"
Level 3	"(3)Link Metro Private Line service is a dedicated, point-to-point, protected metro transport service offered at line rates of DS-3, OC-3, STM-1, OC-12/12c, STM-4/4c, and OC-48/48c . . . **nine of the top 10 global telecom companies, nine of the top 10 consumer ISPs in the U.S., six of the top seven U.S. wireless carriers, and three of the top four global fixed satellite operators** rely on Level 3's metro services."	"DS-3, OC-3, STM-1, OC-12/12c, STM-4/4c, and OC-48/48c"
ITC^DeltaCom	"[C]omprehensive **carrier services** to inter-exchange carriers, CLECs, LECs, ILECs, ISPs, and wireless carriers, including: . . . Metro Network Services."	"DS-1 . . . through OC-48"
ICG	Offers "**carriers** Special Access . . . services that guarantee them the reliable bandwidth they need."	"DS-1, DS-3 and OC-N"
KMC Telecom	"KMC's **Wholesale Services** portfolio delivers: . . . Local Access (from DS-1 to OC-N), Origination/Termination Access, Private Line Service."	"from DS-1 to OC-N"
McLeod	"McLeodUSA Private Line **Carrier Services** feature: Dedicated circuits in a range of bandwidth levels including DS0, DS1, DS3 and OCX."	"DS0, DS1, DS3 and OCX."
Lightpath	"Lightpath's **Service Provider Solutions** focuses on the specialized needs of the carrier industry."	"DS-1 to OC-192"
Cavalier	"Cavalier Business Communications is proud to provide our network . . . to carriers. . . . **Wholesale Services**: Private Line, Private OC-48 and Gig-E Rings, Metro Dark Fiber Rings. . ."	n/a
TelCove	"TelCove's Private Local SONET Ring (PLSR) is a high-capacity network that enables business customers, including **inter-exchange carriers (IXCs)**, to connect multiple locations in TelCove markets via a self-healing, dedicated fiber optic infrastructure."	"DS-1, DS-3, OC-3 . . . OC-12"

MetroCom, Inc., MetroMedia Fiber Network Services, Inc., and SNiP LiNK, LLC, CC Docket Nos. 01-338, 96-98, 98-147 (FCC filed Apr. 5, 2002) (cited in *Triennial Review Order* ¶ 325 n.958 as proof that CLECs generally face obstacles in providing wholesale DS1 loop capacity and in *Triennial Review Order* ¶ 392 n.1218 as evidence that a wholesale market for DS1 transport had not yet developed.). KMC's website now indicates that it has become a "facilities-based full-service wholesale provider, offering a range of private line, switched and network outsourcing services to local, long-haul, wireless, cable and Internet Service Providers throughout the U.S." KMC Telecom, *Wholesale Services*, www.kmctelecom.com/Wholesale/.

[32] *See Triennial Review Order* ¶ 372.

Table 9. High-Capacity *Wholesale* Services Offered by Competitive Fiber Suppliers		
	Wholesale Service	**Capacities**
Grande Comms.	"Grande Networks provides **wholesale carrier** and ISP services . . . Carrier Services Include . . . Metro Access Network."	"DS-X, OC-N, Wavelengths"
Comcast Business	Comcast "offers **carriers** a range of services that can support [their] voice and data transport needs with much lower costs."	n/a
SIGECOM	"Our network serves as the last mile connection and provides network connectivity for **other telephone companies**, and ISP's, and **other service providers**."	"DS1 and DSS Access"
Xspedius	"Xspedius Communications offers superior products and services to **carriers**, **service providers** and enhanced-application providers in 36 markets nationwide."	"from DS-1 through OC-48"
Choice One	"Choice One **Wholesale** Metro Private Line . . . provides a DS1, DS3, OC3, or OC12 of dedicated and protected, full channel, point-to-point capacity."	"DS1, DS3, OC3, or OC12"
AboveNet	Offers "products and services specifically designed to meet the needs of **carriers, ISPs, IXCs, and CLECs**."	"up to OC-48 (OC-192 in some locations)"
American Fiber Systems	"**Carrier-neutral** and committed to supplying dark fiber and **wholesale transport** services."	"from 1 Mbps to 1,000 Mbps"
City Signal	"[D]elivers metro dark fiber solutions enabling **service providers** . . . to deploy broadband applications."	n/a
LightCore	"LightCore provides a full-range of transport services designed specifically to meet the requirements of **telecommunications carriers**."	"from DS-1 to OC-192"
Looking Glass Networks	"Looking Glass builds metro optical networks . . . to meet the requirements of **carrier** and enterprise customers."	"from 1.544 Mbps to 10 Gbps"
Northeast Optic Network (NEON)	"SONET private lines on NEON's network provide a highly reliable complete network solution for **carriers and service providers**."	"DS-3, OC-3, OC-12, OC-48"
OnFiber	Offers "**service providers** such as Internet service providers (ISPs), domestic and international carriers, other carriers (i.e., CLECs, wireless providers) . . . connectivity between traffic aggregation points within a metro area."	"DS-3 (45Mbps) to OC-192 (10 Gbps)"
Con Edison Communications	"PowerWave Wavelength Service is the alternative that network **service providers** seek for overcoming access and capacity constraints within the New York metropolitan area and beyond."	"1.25 GB scalable to 10 GB"
PPL Telcom	"PPL Telcom . . . is a provider of 'last-mile' metro and regional broadband connections to **telecommunications companies, carriers, Internet service providers** . . . that need high-speed data connections between multiple locations."	"DS1 – OC-192"
El Paso Global Networks	"[O]ffers EP Metro Solutions, a **wholesale** high-speed private line transport service that delivers dedicated connectivity between two or more locations within the same city."	"from DS-1 through OC-192"
FPL Fibernet	"We provide **wholesale** fiber optic service with bandwidth capacity from DS-3 to OC-192 for long distance companies, CLECs, BLECs, ISPs, ASPs."	"DS-3 to OC-192"
Lafayette Utilities System	"**Wholesale** products and services include broadband, dedicated packet service, shared packet service, direct Internet access, customer premise equipment, tower lease packages, and last mile service."	"T1 to OC192"
Southern Telecom	"Southern Telecom provides **wholesale** dark fiber optic solutions."	n/a
AGL Networks	"Provides high capacity transport services to **carrier, wireless** and enterprise companies . . . [e]nabl[ing] last-mile connectivity to major office buildings, COLOs, POPs, Bell COs, and carrier hotels."	n/a
Sources: See Appendix H.		

D. Access to Competitive High-Capacity Facilities

A fiber-optic network can certainly be used to offer competitive high-capacity services to all customers situated along its path. In fact, that is normally why the fiber is constructed in the first place. Fiber rings are typically deployed in areas with concentrated demand. *See* § III.B. When fiber is deployed, competing carriers typically "pre-install several break-out points . . . to give engineers access to fiber for future lateral connections" so that lateral extensions can be added later at lower cost.[33] A single metropolitan network "may include a few hundred break-out points," that "may be as close as 20 meters (65 feet) apart."[34] The laterals themselves cost considerably less than the initial ring, because they can be buried just a few inches deep, rather than being laid in ducts.[35] In the suburban areas where many smaller businesses are located, cables can often be strung on utility poles or buried in a shallow earth trench – each about one-tenth the cost of trenching in urban markets.[36] Overall, the cost of extending a network to reach an off-net building keeps falling.[37] And CLECs may reduce the costs further still by sharing the costs with each other, which they are in fact doing.[38]

Competing carriers that do not own or operate their own fiber networks can obtain fiber from other providers, or use a number of other alternatives. Marketplace experience firmly establishes that carriers can and do seek out competitive suppliers of fiber, even where it means

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[33] *Telegeography MANs 2003* at 55-56; *see also id.* ("Break-out points consist of a junction box, usually located beneath a manhole cover or in above-ground 'street furniture,' and a specialized break-out distribution frame to which new fiber connections are spliced. . . . Thus, while increasing construction costs, adding more break-out points – thereby reducing the lateral lengths – allows providers to offer lower prices for connectivity to end-user buildings.").

[34] *Telegeography MANs 2003* at 56.

[35] *See, e.g.*, *Telegeography MANs 2003* at 56; *see also* Stagg Newman, McKinsey and Company, *Broadband Access Platforms, FCC Tutorial* at 28 (Apr. 14, 2002) (For a typical fiber installation, the cost per mile of deploying laterals is about 14 percent of the cost per mile of deploying the actual metro fiber ring.).

[36] *See, e.g.*, Stagg Newman, McKinsey and Company, *Broadband Access Platforms, FCC Tutorial* at 28 (Apr. 14, 2002) (cost per mile for "burying" fiber ranges from $20,000-$60,000; cost for aerial deployment ranges from $5,000 to $10,000; cost for pull-through ranges from $12,000 to $25,000); *see also* N. Gupta, *et al.*, Citigroup Smith Barney, *Stocks Appear to Be Pricing LT Risk of RBOC Entry into Video* at 15 (June 29, 2004) (noting, in the FTTH context, that underground cable "can cost ten times as much per foot to replace as aerial plant.").

[37] *See, e.g.*, *Metromedia Fiber Network/AboveNet – Transforming for Success: Interview with President and Chief Executive Officer John Gerdelman*, OpticalKeyhole.com (July 14, 2003), http://www.opticalkeyhole.com/keyhole/html/abovenet.asp?bhcd2=1075826679 (AboveNet, one of the largest suppliers of metro fiber, has stated that the cost of "installing a lateral connection to a building . . . at the height of the boom . . . could reach $500,000, while in today's climate this has fallen to nearer to $100,000."); *Fiber's Edge: The Access Space is an Interesting Combination of Technology and Real Estate*, Fiberoptic Product News (June 2003) (quoting Pete Mahnke, Corning Cable Systems' Access Market development manager: "The cost of taking fiber to the whatever has significantly decreased over the years."); *As Purse Strings Loosen, Will Cisco Reap the Benefits?*, Fiber Optic News (Sept. 8, 2003) (quoting respondent to a ChangeWave Research survey of optical networking professionals: "[m]ore of my clients are placing last-mile fiber . . . because the carriers are starting to offer no construction or one-time costs for longer-term contracts.").

[38] *See, e.g.*, Fea-Giovannucci Declaration ¶ 28, *attached to* Reply Comments of AT&T Corp., CC Docket Nos. 01-338, 96-98 & 98-147 (FCC filed July 17, 2002) ("AT&T often engages in joint builds with other CLECs in order to share the high fixed costs of construction."); *Triennial Review Order* ¶ 379 ("[I]t is likely that the costs of transport deployment need not be borne by a single carrier, but rather can be shared by multiple carriers.").

relying on a patchwork of different networks, rather than just the facilities of an ILEC. Competing carriers routinely interconnect with each other – each separate carrier thus effectively gets the competitive reach of all the competitive fiber networks combined. There are plenty of points at which competing carriers can interconnect, because they tend to collocate in the same ILEC wire centers, *see* Table 10,[39] and extend their networks to many of the same large office buildings.[40] In every major metropolitan area there are also carrier hotels for competitors to establish these arrangements, *see* Appendix F, and competing fiber suppliers routinely advertise their presence at these locations as well, *see* Table 6, *supra*.

Table 10. Multiple CLECs Frequently Collocate in the Same Locations

	Percentage of Wire Centers with One Competitive Fiber-Based Collocation That Have X or More Additional Competitive Fiber-Based Collocations			
	1	**2**	**3**	**4**
SBC	53%	34%	22%	14%
BellSouth	66%	45%	31%	23%
Qwest*	63%	45%	30%	18%

*Qwest data reflect results from only the seven Qwest MSAs for which data are available.

Most operators of competitive fiber networks – those that entered the market specifically as carrier-agnostic wholesalers, and traditional CLECs too – now readily sell wholesale capacity to other competing carriers. *See* Table 9, *supra*.[41] At least one cable operator is likewise selling network access on a wholesale basis.[42] Many competing carriers are equally willing to lease access to dark fiber, *see* Table 11, which allows other CLECs to deploy their own opto-electronics.[43] Competing carriers can thus daisy chain their own networks with their rivals to

[39] *See Triennial Review Order* ¶ 373 (collocated competing carriers can "access the transport facilities terminated in the collocation arrangements of another carrier" with a "cross-connect . . . provisioned between collocation arrangements"); *Deployment of Wireline Services Offering Advanced Telecommunications Capability*, Fourth Report and Order, 16 FCC Rcd 15435, ¶ 2 (2001) (requiring ILECs to provide these cross connects to CLECs upon reasonable request).

[40] *See, e.g., Telegeography MANs 2003* at 103, 150-51, 199-200, 250-51, 296-98, 364-65 (showing overlap of CLEC fiber networks in Atlanta, Chicago, Dallas, Los Angeles, New York, and Washington); Declaration of C. Michael Pfau, ¶ 44, *attached to* Reply Comments of AT&T, CC Docket No. 96-98 (FCC filed Apr. 30, 2001) ("[I]n many cases multiple CLECs serve the same building . . . AT&T's experience confirms that in a significant percentage of high volume building locations in which AT&T operates there is at least one other CLEC/CAP present.").

[41] Competing carriers report more than $1 billion in revenues from local private line and special access services provided on a wholesale basis. *See* J. Lande & K. Lynch, Ind. Anal. & Tech. Div., WCB, FCC, *Telecommunications Industry Revenues 2002* at 15 (Table 5, Line 305) and 17 (Table 5, Line 305) (Mar. 2004) ("*Telecommunications Industry Revenues Report*").

[42] *See* New Edge Networks Press Release, *New Edge Networks Signs Deal with Cox to Expand Broadband Reach, Choices* (Dec. 17, 2003) (announcing "national resell agreement" with Cox Business Services to "provide high-speed Internet access and wide area networking services to businesses," which is part of New Edge's "Project BigFoot," to provide business customers "last-mile access solutions . . . at virtually any business address in the United States.").

[43] *See, e.g., As Purse Strings Loosen, Will Cisco Reap the Benefits?*, Fiber Optic News (Sept. 8, 2003) (a recent survey of optical networking professionals found that the "cost of optronics is low, so dark fiber is more

obtain very broad geographic coverage, and many CLECs routinely do so. *See* Table 12. Incumbent LECs do exactly the same when deploying competitive facilities outside their home regions.[44]

Table 11. Competitive Carriers Offering Dark Fiber

	MSAs Served*	Dark Fiber Offering
AT&T	70	"AT&T Dark Fiber Offer . . . Dark, or unlit, fiber is purchased as a custom offering from AT&T."
Level 3	25	"(3)Link Dark Fiber service gives you precise and powerful interaction with your fiber network."
ITC^DeltaCom	19	"comprehensive carrier services to inter-exchange carriers, CLECs, LECs, ILECs, ISPs, and wireless carriers, including . . . Dark Fiber."
KMC Telecom	34	"KMC can provide fiber capacity as well as alternative solutions such as microwave links."
Cavalier	8	"Metro Dark Fiber Rings."
Grande Comms.	5	"Dark fiber indefeasible right to use (IRU) [and] Dark fiber lease."
Xspedius	35	"dark fiber and inventory conduit in six core Tier I markets across the United States."
AboveNet	12	"With AboveNet's dark fiber, you can meet your growing bandwidth demands both quickly and cost-effectively."
American Fiber Systems	6	"dark fiber cable (from 288 to 864 strands) in and around the metro area for maximum high-capacity service coverage in high-density business districts."
City Signal	6	"CSC dark fiber solutions are a cost effective, long-term answer to any organizations networking requirements."
Fibertech	16	"dark fiber metro networks can provide you with a myriad of cost-cutting benefits."
LightCore	11+	"Surplus dark fiber assets are . . . available for purchase on selected routes and in selected markets."
Looking Glass	12	"dark fiber solutions offer flexible, fixed-cost access to virtually unlimited capacity."
NEESCom/Gridcom	5	"With NEESCom dark fiber, you control your communications costs and network expansion rate."
NEON	13	"NEON offers both long-haul and metro dark fiber in specific regions and NEON can acquire fiber for customers on a custom integration basis."
Progress Telecom	25	"range of reliable service delivery . . . includes dark fiber on our Southeast network."
Edison Carrier Solutions	2	"Dark fiber is available in a multitude of routes in metropolitan area for use as a backbone network as well as in local loops that serve carrier hotels, carrier points of presence, and central offices."
FPL FiberNet	4	"high quality metro dark fiber."
Southern Telecom	2	"provides metro dark fiber service laterals and backbone fiber that can deliver th[e] last mile to ensure fast connections in the Southeast."
AGL Networks	2	"allows you to lease dark fiber in strand counts and bundles — from point-to-point or over the entire network."

* Information on the availability of dark fiber on an MSA-specific basis was not available for most carriers, therefore MSAs served indicates the MSAs in which the carrier operates fiber networks and provides high-capacity services.
Sources: See Appendix H.

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affordable to companies in the large metro markets."); *Triennial Review Order* ¶ 318 ("[T]he record demonstrates that there is no impairment with respect to obtaining and attaching the requisite optronics necessary to light dark fiber at the OCn level to provide service.").

[44] *See, e.g.*, Cuddy Declaration ¶¶ 3-12, *attached to* Competing Providers are Successfully Providing High-Capacity Services to Customers without Using Unbundled Elements, *attached to* Ex Parte Letter from M. Glover, Verizon, to Marlene Dortch, FCC, CC Docket Nos. 01-338, 96-98 & 98-147 (July 2, 2004) ("*Verizon July 2 Ex Parte*"); L. LaBarba, *FPL Fibernet Lights Florida's Fire*, Telephony (Mar. 18, 2002) (In 2000, SBC signed a $110 million deal with FPL Fibernet to buy dark fiber in Florida.); FiberNet Press Release, *SBC Telecom, Inc. Completes Agreement with FiberNet for Network Services* (Jan. 21, 2004).

Table 12. Examples of Competitive Daisy-Chaining	
AT&T	"To connect the customer premises, AT&T has deployed its own last-mile fiber as well as used a number of partnership arrangements with fiber-based startups." (July 2003)
	"AT&T . . . is using four independent Ethernet provider partners to help it reach customers beyond its own fiber footprint." (Nov. 2003)
MCI	"WorldCom contracts with 41 CLECs" for competitive access provisioning. (Oct. 2002)
	"MCI uses a variety of methods, including partnerships and incumbent facilities, to bridge the last mile." (July 2003)
Sprint	"Metro networks, such as this one [from AGL Networks] in Phoenix, reduce Sprint's reliance on incumbent local exchange carriers." (May 2003)
	"For Tier 1 metros, Sprint will be leasing dark fiber for metro core rings and laterals. Sprint has several partnership arrangements with alternative fiber providers." (July 2003)
	Sprint signed an agreement with Level 3 in November to use Level 3 dark fiber in Detroit. (Nov. 2003)
Cox	In November, Cox signed a long-term contract to use American Fiber Systems dark fiber in Kansas City, MO. (Nov. 2003)
	"Cox now utilizes a full suite of Level 3 services, including . . . metropolitan dark fiber." (June 2003)
ITC^DeltaCom	ITC^DeltaCom signed an agreement with AGL Networks in October to lease access to fiber on AGL's Atlanta area network. (Oct. 2003)
Lightship Telecom	Lightship Telecom signed a contract to use Fibertech Networks' dark fiber in Providence and Springfield, MA.
TelCove	TelCove recently sign an agreement to lease dark fiber from Southern Telecom in the Atlanta metro area.
US LEC	US LEC is using competitive access services from numerous "CAPs [including] (Cox Communications, Dominion Telecom, DukeNet, e.spire, InterMedia, MFS, Progress Telecom, Time Warner, XO)."
Yipes	In October, Yipes signed a deal with StarPower to use a StarPower dark fiber ring and multiple lateral connections in Washington, DC. (Oct. 2003)
	In March, Yipes signed a 10-year master fiber agreement with Fibertech Networks to utilize capacity on Fibertech's Providence, RI network. (Mar. 2004)
Sources: See Appendix H.	

Access to competitive high-capacity facilities also is available from several consolidators – entities designed to assist CLECs in obtaining access to each other's networks, and to aggregate their demand in order to obtain access to ILEC special access at substantial discounts. Global Internetworking has recently announced its new "Unbundled Network Element Replacement" service that provides competitive carriers "timely solutions from a single provider, eliminating the hassle of finding multiple alternative providers, making volume purchase commitments, negotiating multiple agreements and dealing with the provisioning groups of numerous other carriers."[45] The company claims to have "long-term wholesale relationships" with "1,300 facilities-based carriers" providing "access to over 535,000 lit buildings" as well as

[45] Global Internetworking Press Release, *Global Internetworking Launches Unbundled Network Element Replacement (UNE-R) Service, Solution Helps Telcos Find Cost Effective UNE Loop and Transport Alternatives* (Sept. 13, 2004).

"IXC POPs, and collocation facilities" in "every 1st, 2nd and 3rd tier market in the U.S."[46] Global Internetworking already "receives and fulfills thousands of requests for high-capacity data transport services in every market in the U.S."[47] A second firm, Last Mile Connections, is "building the National Telecommunications Alliance – an industry-wide initiative that will allow carriers to efficiently interconnect their assets to enhance the size of their footprint of buildings in major metropolitan areas."[48] It claims that its "pooling of competitive local assets will result in every member having access to over 20,000 end-user buildings on a nationwide basis."[49] Some competing carriers also act as aggregators of high-capacity facilities for other carriers.[50]

As the *Triennial Review Order* recognized, the geographic scope of high-capacity competition is extended further by fixed wireless and cable networks.[51] The fixed wireless industry was not doing well at the time the *Order* was issued, but it has been dramatically revived since. *See* Table 13 & § I.C (Table 10). In March 2003, a new industry standard – IEEE 802.16a (WiMax) – was finalized.[52] New WiMax equipment will provide much faster connections, over much greater distances (up to 30 miles, with a typical cell radius of 4-6 miles), and without a requirement that there be a clear line of sight.[53] Standardization has also sharply lowered costs.[54] Today, at least nine fixed wireless providers are now offering high-capacity

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[46] Global Internetworking, *About Us: Company Overview*, http://www.globalinternetworking.com/home/index.php?pg=about; Global Internetworking, *About Us: Why Global Internetworking?*, http://www.globalinternetworking.com/home/index.php?pg=about&sec=why&reason5=true; Global Internetworking, *Agents/Partners*, http://www.globalinternetworking.com/home/index.php?pg=agents.

[47] Global Internetworking, *Services*, http://www.globalinternetworking.com/home/index.php?pg=services.

[48] Last Mile Connections, *Overview*, http://www.lastmileconnections.com/pages/alliance/overview.html.

[49] *Id.*

[50] *See, e.g.*, McGraw Communications Press Release, *McGraw Communications Signs Multi-Million Dollar Wholesale Agreement with PAETEC Communications*, Inc. (Aug. 16, 2004) (announcing agreement where McGraw will buy special access T1 circuits from Paetec, which in turn obtains them from Verizon as special access).

[51] *See, e.g.*, *Triennial Review Order* ¶ 301.

[52] *See, e.g.*, G. Campbell, *et al.*, Merrill Lynch, *Everything over IP: VoIP and Beyond* at 41 (Mar. 12, 2004) ("*Merrill Lynch, Everything over IP*"). The standard was approved by the IEEE and released January 29, 2003. *See* WiMAX Forum Press Release, *Group Expanded to Promote New Wireless Broadband Technology Standard* (Apr. 9, 2003). Initial vendor tests are scheduled for the third quarter of 2004, and certified equipment is expected in the market by the first half of 2005. *See* M. LaBrecque, WiMAX Forum President, *Enabling Deployments through Standards & Interoperability*, presentation before Wireless Communications Association Conference, at 10 (Jan. 20, 2004).

[53] *See, e.g.*, Comments of the License-Exempt Alliance, ET Docket No. 03-122, at 4 (FCC filed Sept. 3, 2003) (WiMax provides connections "up to 30 miles, with a typical cell radius of 4-6 miles."); *Merrill Lynch, Everything over IP* at 41 ("The 802.16a extension, ratified in March 2003, uses a lower frequency range (2-11 GHz), and does not require line of site. It has a range of up to 80 km compared to WiFi's 100m, and 11 Mbps data transfer rates."); Intel Corp., White Paper, *IEEE 802.16 and WiMAX – Broadband Access for Everyone* at 3 (2003) ("a single 'sector' of an 802.16(a) base station . . . provides sufficient bandwidth to simultaneously support more than 60 businesses with T1 connectivity.").

[54] *See, e.g.*, M. Angell, *Techs Again Tout Fixed Wireless*, Investor's Business Daily at A06 (May 7, 2003) ("With a standard in place, that makes for a better selection of chips and should bring down the price of the technology.") (quoting Margaret LaBrecque, president, WiMax Forum); D. Molta, *[News Without the Noise] – 802.16a: Sedan or Mack Truck?*, Network Computing (Aug. 7, 2003) ("As IEEE standardizes on a metropolitan

services in nearly 75 separate MSAs, including both major metropolitan areas and Tier II and Tier III cities. *See* Table 14 & Appendix G.

Fixed wireless also has emerged as an excellent tool for extending existing fiber networks quickly and cheaply to off-net customers.[55] Fixed wireless is being used by a number of wireline CLECs – and even cable operators[56] – to expand their fiber networks, while other CLECs are currently experimenting with the technology. *See* Table 15. A number of wireline CLECs already own their own fixed wireless spectrum,[57] while others may now obtain that spectrum from third-party suppliers. A number of the fixed wireless providers offer their services on a wholesale basis. *See* Table 16. As one such provider notes, "the secondary spectrum leasing market is unfolding with promise."[58]

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wireless MAC interface and WiMax pushes the OFDM physical-layer interface, it's predictable that the cost of base-station equipment and subscriber modems will come down."); M. Hogan, *To the WiMAX: A New Protocol Spices Up the 802.X Alphabet Soup*, Entrepreneur (Dec. 1, 2003) ("WiMAX equipment could cost less than a quarter of current technology, with prices starting under $ 2,000.").

[55] *See, e.g.*, fSONA Press Release, *fSONA Signs Global Procurement Agreement with Bechtel* (Dec. 2, 2003) ("[T]he time for deployment is drastically reduced when compared to placement of fiber optic cable.") (quoting Bechtel principal vice president and CTO Jake MacLeod); airBand, *airBand Technology*, http://www.airband.com/technology/index.html ("airBand services can be, and typically are, deployed within days, not months."); TowerStream, http://www.towerstream.com/about.asp ("Installation typically occurs within 2 weeks of the order date. With our Rapid Installation Program (RIP), you will be up and running in 48 hours."); K. Henderson, *Fixed Wireless Round Two*, Phone+ Mag (Feb. 2004), http://www.phoneplusmag.com/articles/421carrier01.html (According to XO, "in most cases, they are able to secure [roof rights from the landlord] without having to pay a fee or share revenue with the property owner.") (citing Mark Salter, vice president, Broadband Wireless, XO Communications); C. Kuhl, *Looking for Big Money, Cable is . . . Getting Down to Business*, CED (Nov. 1, 2003) (Chris Martin, VP, Marketing, Arcwave: Fixed wireless "can be dropped in one day at far less than the cost of coax or fiber, which will cost about $15,000 for 1,000 feet running from existing cable plant. Our capital expenditure is $730 per customer with a three-year break-even point with 1.5 percent penetration.").

[56] Arcwave Press Release, *Arcwave Introduces ARCXtend Wireless Plant Extension Solution for Cable MSOs* (Sept. 15, 2003) (Lindsay Schroth, analyst, Yankee Group: "Wireless access technology offers the potential for cable MSOs to significantly increase their penetration of the commercial voice and data services market. . . . With the introduction of ARCXtend, Arcwave has made it possible for Cable MSOs to deploy and manage a last mile wireless solution without a major capital or operating investment.").

[57] *See, e.g.*, XO, *Network Details*, http://www.xo.com/about/network/details.html ("XO owns the largest footprint of U.S. fixed wireless spectrum, which covers 95% of the population in the top 30 U.S. cities."); Sprint Corp., Form 10-K (SEC filed Mar. 9, 2004) (Sprint owns MMDS licenses across the country and is "continuing to invest in the spectrum.").

[58] First Avenue Networks Press Release, *First Avenue Networks' Financing Totals $4.35 Million* (Feb. 2, 2004); *see also* IDT Solutions Press Release, *IDT Reports Results for Third Quarter of Fiscal Year 2004* (June 10, 2004) ("IDT Solutions plans on redirecting its [fixed wireless] assets toward providing private line services, wholesale services, and spectrum leasing to government and government integrators, telecommunications and cable companies and mobile and fixed line carriers as well as backhaul services.").

Table 13. Fixed Wireless Developments	
Availability	At least 8 providers offering high-cap services using unlicensed spectrum. Existing spectrum is underutilized: "MMDS and ITFS" spectrum is "currently lying fallow."
	"802.16a offers greater network flexibility by supporting non line-of-sight transmission and coverage area up to 31 miles."
	40% of enterprise businesses, 29% of mid-sized businesses, and 23% of small businesses report using fixed wireless
Reliability	"Weather does not adversely affect our service." "TowerStream guarantees 99.99% network availability." "Teligent's network is designed for greater than 99.995% end-to-end reliability."
Quality	airBand's "robust network infrastructure provides symmetrical bandwidth upstream and downstream, supplying customers with constant committed bandwidths not degraded even during peak periods of traffic volume." "TowerStream's network features symmetrical download and upload speeds." NextWeb offers "[s]ymmetrical speeds for business applications."
Price	"Many WISPs offer businesses 3Mbps or more of bandwidth for prices comparable to business-grade DSL service." "[F]ixed wireless . . . cost savings can range from to 20 to 50 percent." "Enterprises can use WiMAX instead of T1 for about 10 percent of the cost." "AirTap will be able to offer its customers a 30 to 60 percent savings over its competitors."
Sources: See Appendix H.	

Table 14. Fixed Wireless Providers		
Company	**MSAs Served**	**High-Capacity Service Offerings**
airBand	Dallas/Ft. Worth, Houston, Phoenix	"[D]edicated private line to enterprise customers that need a WAN extension to their current network." "[I]t is available as a last mile solution for carriers that want to avoid the high costs associated with laying copper or fiber." Service is available at speeds "**up to the OC-12 level.**"
TowerStream	Boston, Chicago, New York and Providence Deployment in Los Angeles before year-end 2004 with plans for another Top 20 market deployment in early 2005	Wireless connectivity at speeds from **512k all the way up to multiple gigabytes**.
Teligent*	71 MSAs**	"[D]edicated Local Private Line service with access capabilities from **T1 to OC3** (up to 155 Mbps)."
AirTap	n/a	"[S]ecure multimegabit Internet connections to the vast population of larger businesses throughout the Nation's top metropolitan areas." Service available at speeds "**up to 144 Mbps** per redundant client."
NextWeb	Los Angeles, San Francisco, San Jose, Santa Barbara, Thousand Oaks-Oxnard	High-speed dedicated wireless access at speeds from **1 Mbps to 10 Mbps**.
WindChannel	Raleigh and Durham, NC	"Metro Point to Point offers . . . the fastest, most secure, cost effective and reliable connections available, with speeds from **1 Mbps to 45 Mbps**."
SkyBridge Wireless	Las Vegas	"Point to Point links from **512Kbits to 650Mbits**"
Conterra	Columbia, SC Plans to expand to Charleston, Greenville, Spartanburg, Charlotte, and Augusta	"[A] broad range of access solutions, from **500 Kbps to over 600 Mbps** of carrier-grade bandwidth."
ISG	Grand Rapids, MI	"Business Class Broadband Connectivity . . . [with] [a]ccess speeds from **256kbps to 45Mbps** . . . with quality equivalent to fiber."

* First Avenue Networks, a wholesale spectrum provider, has signed a letter of intent to purchase Teligent's 24 GHz spectrum licenses, along with its fixed wireless and radio assets. *See* First Avenue Networks Press Release, *First Avenue Networks Signs Letter of Intent to Acquire Teligent Assets* (July 8, 2004).

** *See* Appendix G for the specific MSAs served.

Sources: See Appendix H.

Table 15. CLEC Use of Fixed Wireless To Extend Fiber Networks	
AT&T	"AT&T Managed Internet Service gives Maritz a reliable, redundant Internet connection with a 10-mbps fixed pipe and AT&T-managed router. Last mile connectivity is provided by an innovative 18-gigaherz wireless radio link as part of the company's local loop." (AT&T Case Study, 12/01) "[W]e're looking at all types of technologies that will allow us to bypass the ILECs all together. We're checking out power line, 802.11, fixed wireless and free space optics technologies." (Hossein Eslambolchi, CTO, 12/03)
Cox	"A growing number of [cable] operators are looking at wireless technology as a cost-effective means of reaching a significant share of the commercial market previously thought to be unreachable. 'We're watching wireless development very closely. We're very open to using services to complement what we do and are trialing it now.'" (Bill Stemper, VP, Cox Business Services, 11/03)
Covad	Covad is "looking for ways to extend the copper plant economically and WiMAX is very much a possibility." (Ron Marquardt, Technical Director, 3/04)
XO	"[Fixed wireless] trials could be a very meaningful breakthrough for XO, in that XO can reduce 'last mile' costs, XO can become even more price competitive than it is today for business customers." (Carl Grivner, CEO, 1/04)
OnFiber	OnFiber, a wholesale metro fiber provider, is working with fSONA Communications and Terabeam, providers of wireless solutions using FSO technology, to "extend the network" where "cost or geography prohibit the use of fiber infrastructure." (Michael Guess, COO, 10/03)
Terabeam	"We're in trials with just about every major tier-one carrier in this country and with many tier-one carriers outside the U.S." (Dan Hesse, CEO, 4/03)
WilTel	"The combination of fixed wireless connectivity to Extended On-Net and WilTel's managed services creates tremendous opportunities for customers in Tier 2 and 3 markets, because now they can have direct, on-net access to WilTel's robust services in the manner that is most effective for them – be it fiber builds or direct wireless connections." (Tony Tomae, SVP, Marketing, 5/04)
Sources: See Appendix H.	

Table 16. Fixed Wireless Providers Offering Wholesale Services	
airBand	"airBand offers a dedicated [wireless] private line . . . as a last mile solution for **carriers** that want to avoid the high costs associated with laying copper or fiber."
Conterra	"Conterra is deploying a hybrid of fixed wireless technologies, both in licensed and unlicensed spectrum, to meet the needs of small to large enterprises including, governments, schools and other **carriers**."
First Avenue Networks	First Avenue leases licensed spectrum in 39GHz band to "**large and small telecom providers**" using "licenses that cover 99% of the U.S," including "350 MHz of spectrum in the top 50 markets." Leases spectrum to carriers on a "per-link basis" at varying capacities "that can accommodate speeds from **T-1 up to OC-12**" for as little as "$500 per link, per year."
IDT Solutions	IDT Solutions "will rent blocks of the company's wireless spectrum to **other carriers**."
NextWeb	NextWeb is "counting on its turnkey offer to entice **landline carriers** to add broadband wireless.'"
Teligent	"Teligent will provide transport services to other carriers." "Teligent provides a dedicated Local Private Line service with access capabilities from **T1 to OC3** (up to 155 Mbps). Teligent's Local Private Line is a licensed digital point-to-point service designed for **carriers** . . . who require scalable bandwidth and secure direct connectivity to additional locations."
WindChannel	"With a carrier-grade network deployed across thousands of square miles, WindChannel provides **carriers** with the ability to reach their customers wirelessly, effectively solving the 'last mile' challenge."
XO	"XO is rolling out its fixed wireless services directly and through **other carriers** that would resell it to end users. A handful of **smaller carriers** have resold it, says [Mark] Salter [the company's vice president of broadband wireless]."
Sources: See Appendix H.	

Cable operators are extending their fiber-to-the-curb networks in much the same way. Cable broadband can substitute directly for traditional private line services used by small businesses,[59] and the rise of voice-over-broadband services described in § II.A makes this option all the more attractive. The fiber-to-the-curb cable networks reach ubiquitously in residential areas, and they already pass many businesses as well.[60] Cable operators are now aggressively extending their fiber to the premises of large office buildings.[61] In recent presentations to analysts, Cox Business Services announced a major 2004 plan to "expand [the] capabilities of the HFC infrastructure,"[62] while Time Warner explained that "we do have an opportunity to go more aggressively after the enterprise business."[63] Comcast "has been delivering service to commercial organizations since 1995 and has thousands of customers leveraging the Comcast network for critical business applications."[64] *See also* § III.E.2.

While not as capacious as fiber, fixed wireless and coaxial cable facilities offer large amounts of capacity that are routinely subdivided and sold to customers in smaller increments. Fixed wireless providers routinely offer high-speed connections from as low as DS1, all the way up to 100 Mbps and higher. *See* Tables 13 & 16, *supra*. Cable operators use coaxial cable to link fiber-to-the-curb networks to residential users of cable video and broadband services. Similar techniques are used to offer 1 to 4 Mbps downlinks, and 256 kbps to 1.5 Mbps uplinks, to business customers.

Finally, competing carriers can always fill out gaps in their geographic coverage by reselling the ILEC's tariffed special-access services.[65] As described in more detail in § III.E.2

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[59] C. Munroe, IDC, *U.S. Private Line Forecast and Analysis, 2002-2007* at Table 2 (Dec. 2003) ("Broadband [*i.e.*, cable modem and DSL] substitution for sub-T1 and T1 lines will account for over $3 billion in lost private line revenue" between 2003 and 2007.); K. Burney, *et al.*, In-Stat/MDR, *Cash Cows Say "Bye-Bye": The Future of Private Line Services in US Businesses* at Table 15 (Dec. 2003) ("*In-Stat/MDR Private Line Report*") (77% of "enterprise" respondents and 55% of "middle market" respondents were considering replacing or had plans to replace their T1 line with a cable modem or DSL connection.).

[60] *See, e.g.*, *In-Stat/MDR Private Line Report* at 19, Table 9 (41 percent of "enterprises" and 32 percent of "middle market" businesses were using cable modem service in their main offices); Jim Robbins, President and CEO, Cox Communications, presentation before the Sanford Bernstein 19th Annual Strategic Decisions Conference (June 2003) (Cox is "leveraging the residential infrastructure" in deploying services to business customers.); J. Reif-Cohen, *et al.*, Merrill Lynch, *Cox Communications Inc.* at 6 (July 30, 2004) ("Cox's business unit leverages all its existing infrastructure by using the same switches, NOC (network operating center), billing system, brand and technicians/truck that the core cable business uses.").

[61] *See Triennial Review Order* ¶ 40; *see also* D. Chang, EVP, Finance & Strategy, Charter Communications, presentation before the JP Morgan High Yield Conference, at 23 (Feb. 2, 2004) (Charter is moving "'up-market' to compete in Enterprise RFP environment").

[62] J. Hayes & B. Stemper, Cox Communications, presentation before the UBS Media Week Conference, at 23 (Dec. 2003).

[63] Thomson StreetEvents, *TWX – Q2 2004 Time Warner Inc. Earnings Conference Call Final Transcript* at 8 (July 28, 2004) (quoting Don Logan, Chairman of Media, Communications Group, Time Warner).

[64] Comcast Commercial, *Services*, http://www.comcastcommercial.com/index.php?option=content&task=view&id=6&Itemid=27.

[65] Competing carriers are now able to obtain special access at significant discounts by purchasing it from consolidators like Global Networking. The company buys special access from ILECs at the maximum volume discounts, and then resells it to CLECs who might not otherwise qualify for such discounts, resulting in savings of

below, CLECs now routinely use special access as needed, in all geographic markets, at all levels of capacity, to serve all customer segments.

According to FCC data, as of year-end 2002, nearly two-thirds of BOC special access revenues were generated from sales to other carriers.[66] According to more recent data reported by Verizon, more than 80 percent of Verizon's total special access revenues are generated from sales to other carriers.[67] As described below, in all of the markets in which special access service is used as an input, competition is thriving. And in many of those markets competing carriers are the dominant providers. *See* §§ III.E.1, III.E.2.

E. Competitive Analysis

The economics of fiber deployment ensure that the ILEC will face intense price competition even when multiple CLECs rely, in part, on each other's facilities, to offer area-wide service. The main cost of deploying fiber is the cost of physically laying the cable.[68] This is why providers routinely deploy multi-fiber cables that offer far more capacity than they can currently use,[69] and why the *Triennial Review Order* concludes that "the cost to deploy fiber does not vary based on capacity."[70] The incremental cost of adding electronics to "light" the dark fiber later is very small by comparison – about 5 percent of laying the fiber.[71] Thus, even a single fiber cable can put severe price pressure on the ILEC's service.

Competition still thrives with CLECs sharing a single fiber, just as it does when CLECs share underground conduits and poles with each other and with ILECs, and just as it does in the backbone market, where competitors routinely lease fiber from each other, both lit and unlit, to extend geographic coverage and add capacity as needed.[72] When CLECs lease dark fiber to each other, they still deploy their own opto-electronics.[73] As in the backbone market, the glut of fiber

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20-50 percent below the tariffed rates that might otherwise apply. *See* Global Internetworking Press Release, *Global Internetworking Launches Unbundled Network Element Replacement (UNE-R) Service* (Sept. 13, 2004).

[66] *See Telecommunications Industry Revenues Report* at 14 (Table 5, Line 305) and 18 (Table 6, Line 406).

[67] *See* Verses/Lataille/Jordan/Reney Declaration ¶ 49, *attached to Verizon July 2 Ex Parte*; *Verizon July 2 Ex Parte* at 17.

[68] *See, e.g.*, Stagg Newman, McKinsey and Company, *Broadband Access Platforms, FCC Tutorial* at 28 (Apr. 14, 2002) ("Typical breakdown of costs for typical trenching: Labor, 80%-85%; Equipment, 5%-10%; ROW, 5%-10%"); Insight Research Corp., *Private Line and Wavelength Services 2004-2009* at 23 (Sept. 2004) ("The fixed cost of building a fiber network includes the rights of way and the cost of digging the trench. . . . The fixed costs represent a significant portion of the total. On their initial build, many emerging carriers spent extra capital to lay additional fibers for future use."). *See also Triennial Review Order* ¶ 382 ("[T]he record indicates that a substantial part of the costs of deploying transport facilities is the sunk cost of burying, or otherwise deploying the fiber.").

[69] *See* note 6, *supra*.

[70] *Triennial Review Order* ¶ 303.

[71] *Telegeography MANs 2003* at 82, Fig. 1.

[72] *See, e.g.*, Level 3 Press Release, *Level 3 to Provide Optical Wavelength Services to Cox Communications in U.S.* (June 17, 2003); XO Communications, Inc., Form 10-K (SEC filed Mar. 15, 2004) ("We provide intercity transport primarily through five year leases of wavelength capacity from Level 3."); Grande Communications Press Release, *Grande Communications Partners with Qwest Communications International* (Aug. 31, 2000).

[73] *See, e.g., Triennial Review Order* ¶ 311.

capacity on a given local route creates a wide margin between wholesale and retail prices. Robust competition does not require multiple, independent underground conduits or poles along each route; when each cable contains multiple strands of glass, many of them unlit, CLEC competition does not require multiple independent CLEC cables, either.

In any event, as discussed further below, fixed wireless and cable extend each fiber network's footprint considerably, to the point where a CLEC network linked up to any given ILEC wire center can reach essentially all businesses served by that center. Tariffed special access services also can readily fill out each CLEC's geographic footprint. Competition is likewise thriving in the provision of services that use high-capacity facilities – large enterprise, special access, long distance, and wireless. Competition here has emerged with little or no use of UNEs, and any "reliance on special access has not posed a barrier that makes entry uneconomic."[74]

1. High-Capacity Transport

High-capacity connections between other carriers and ILECs can be made either directly at the ILEC's end office, via a fiber entrance facility, or indirectly at an adjoining tandem office, using fiber-based transport. Even where competitive fiber transport is unavailable, competing carriers can obtain special access from the incumbent.

a. Entrance Facilities

An entrance facility is the link between an incumbent carrier's wire center and another carrier's network. Either carrier can provision it, and neither has any first-mover or sunk-cost advantage – these links are not part of the ILEC's legacy network,[75] and as the Commission has previously concluded, ILECs and CLECs stand on equal footing in deploying high-capacity facilities to locations not previously served.[76] Competing carriers agreed in the *Triennial Review* proceeding that these links are "the most competitive type of transport;"[77] competitive deployment of these links is "pervasive;" and the price ILECs charge for these links "closely mirrors UNE rates."[78]

Based on the limited data available, it is possible to determine at least some of the locations where these competitive alternatives are already available: competitive entrance facilities are available, at a minimum, in every wire center where one or more competing carriers has collocated fiber-based transmission equipment.[79] The presence of such equipment

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[74] *See United States Telecom Ass'n v. FCC*, 359 F.3d 554, 575 (D.C. Cir. 2004) ("*USTA II*").

[75] *See Triennial Review Order* ¶ 366.

[76] *See Triennial Review Order* ¶¶ 366-67; *see also id.* ¶ 275.

[77] *Triennial Review Order* ¶ 367 n.1122.

[78] *Triennial Review Order* ¶ 367 n.1122 (citing Letter from Ruth Milkman, Counsel for WorldCom, to Marlene H. Dortch, Secretary, FCC, CC Docket Nos. 01-338, 96-98, 98-147, Attach. at 7 (Nov. 18, 2002)).

[79] *Cf. Access Charge Reform*; *Price Cap Performance Review for Local Exchange Carriers*, Fifth Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd 14221, ¶ 81 (1999) ("*Pricing Flexibility Order*") (holding that fiber-based collocation provides strong indication of competitive entrance facility deployment).

establishes one CLEC's network-wide link to that wire center; as noted earlier, competing carriers (like ILECs) deploy continuous, self-connected networks, not discrete fragments of network here and there.[80] And because CLECs have abundant opportunity to interconnect their networks with each other, all of them can gain access to that same wire center over the same competitive entrance facility.

As both the Commission and the D.C. Circuit have found, however, fiber-based collocation provides a "conservative measure of competition," because it "fails to account for the presence of competitors that . . . have wholly bypassed incumbent LEC facilities."[81] This is all the more true because the ILEC wire center is no longer the only – or even the principal – point of traffic concentration. A great deal of traffic is now sent directly to data centers and collocation hotels, where data carriers exchange traffic with both each other and large business customers.[82] CLECs undoubtedly transport a great deal of their traffic through these alternative points of traffic aggregation – according to New Paradigm's *CLEC Report 2004*, CLECs earn 43 percent of their revenues from data services.[83] Business are now using dedicated circuits to carry far more data traffic than voice traffic, with the disparity growing wider each year.[84]

As discussed in § III.A above, competing carriers have already obtained fiber-based collocation in 16 percent of Bell company wire centers, which contain 47 percent of total access lines and 55 percent of total business lines. More than half of all BOC wire centers with 5,000 or more *business* lines now have fiber-based collocation. *See* Table 17. It is therefore reasonable to conclude that other wire centers that meet this criterion could economically support competitive fiber as well.

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[80] In the very rare case where a competing carrier might obtain fiber-based collocation to serve a single customer location, that location would have to be generating so much traffic that it would certainly be economical for the CLEC to link that spur to the rest of its own network as well.

[81] *WorldCom v. FCC*, 238 F.3d. 449, 462 (D.C. Cir. 2001) (quoting *Pricing Flexibility Order* ¶ 95); *Pricing Flexibility Order* ¶ 104. This framework also is conservative because it examines only fiber-based collocation, even though competitive carriers have obtained thousands of collocation arrangements that, although not fiber based today, could easily be modified to connect to third-party fiber.

[82] *See, e.g.*, AboveNet, *AboveNet Access Services – Building Access Services*, http://www.above.net/products/access-buildingaccess.html ("AboveNet's extensive private metropolitan networks have been designed to provide direct access to carrier hotels, data centers and key commercial office buildings."); NEON Communications, *SONET Private Line Service*, http://www.neoninc.com/page.cfm?contentID=118 ("NEON's Metro SONET Private Line Service provides an efficient solution to access key carrier hotels [and] Internet peering and transit points.").

[83] *See* New Paradigm Resources Group, Inc., *CLEC Report 2004*, Ch. 3 at Table 14 (18th ed. 2004) ("*CLEC Report 2004*").

[84] *See, e.g.*, M. Bowen, *et al.*, Schwab SoundView Capital Markets, *AT&T Corp.* at 2 (Jan. 21, 2004) ("ATM and frame relay services constitute the majority of telecom spending by businesses."); D. Pappalardo, *AT&T's Eslambolchi Talks IP*, Network World Fusion (Dec. 10, 2003), http://www.nwfusion.com/newsletters/optical/2003/1208optical2.html (Hossein Eslambolchi, AT&T CTO: "Each day we transport 10 times as much data as voice traffic."); Nortel Networks, *Nortel Network Succession Voice over IP Backgrounder*, http://www.nortelnetworks.com/solutions/pt/cs/collateral/csp_bkg_voip6.pdf ("Although data traffic was once largely carried over the voice network, data traffic is now double that of voice and increasing 2x every year.").

Table 17. Fiber-Based Collocation in Wire Centers with 5,000 or More Business Lines		
	Percentage of Wire Centers with 5,000 or More Business Lines and Access Lines Served by These Wire Centers with One or More Fiber-Based CLEC Collocation Nodes	
	# of Wire Centers	**% of All WCs**
Verizon	545	56%
SBC	449	40%
BellSouth	263	70%
Qwest*	115	89%
Total	**1,372**	**53%**
*For Qwest, percentages reflect data for only the seven Qwest MSAs for which data were available.		

b. High-Capacity Transport Between ILEC Wire Centers

Transport facilities connect ILEC wire centers to each other. As with entrance facilities, fiber-based collocation provides a straightforward (albeit conservative) indication of which wire centers are served by competitive fiber. When a single CLEC collocates in two or more wire centers, it is reasonable to assume that competitive transport is available between or among those specific locations. As the Commission has recognized, when competing carriers enter a market, they "typically deploy fiber rings" that "may connect several incumbent LEC central offices in a market" as well as other points of traffic aggregation such as IXC POPs, data hotels, and the networks of other competitive providers.[85] Carriers use these rings to "aggregate end-user traffic for backhaul to their switch, or other equipment."[86] Thus, each wire center that contains competitive fiber is linked back to a centralized facility, which in turn connects to other wire centers with competitive fiber, thereby enabling the carrier to connect all the extremities together at single central location, rather than by providing a web of direct connections between them. And once again, interconnections among CLEC networks ensure that any wire center with collocated fiber can be used to reach any other wire center with collocated fiber, regardless of which CLEC is collocated at each end.

c. High-Capacity Transport Between ILEC Wire Centers and Long-Distance Networks

Long-distance carriers require high-capacity transport between their own offices, on the one hand, and ILEC wire centers or tandem switches, on the other. In UNE terms, connections between ILEC wire centers on the one hand, and long-distance networks on the other, are either entrance facilities or transport, or a combination of the two.

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[85] *Triennial Review Order* ¶ 370.

[86] *See Triennial Review Order* ¶ 370; *id.* ¶ 361 ("Competing carriers generally use interoffice transport as a means to aggregate end-user traffic . . . by using dedicated transport to carry traffic from their end users' loops, often terminating at incumbent LEC central offices, through other central offices to a point of aggregation.").

More generally, high-capacity connections account for only part of the cost of providing long-distance services; robust competition evolved in this market well before UNEs were first made available.[87] Indeed, long-distance carriers have been restricted from using UNEs exclusively to transport long-distance traffic.[88] As discussed in § III.E.2 below, competition in the long distance market has continued to intensify since the *Triennial Review*, and is expected to continue to increase in the future.

d. High-Capacity Transport Between ILEC Wire Centers and Wireless Networks

As with long-distance carriers, wireless carriers require high-capacity transport between their own offices and between their own offices and ILEC wire centers, which are either entrance facilities or transport, or a combination of the two. As discussed in § II.B, the provision of wireless services is intensely competitive, and has become even more so since the *Triennial Review*. As the D.C. Circuit recognized, this competition emerged entirely without access to UNEs. Wireless carriers have not been permitted to obtain transport UNEs at all;[89] they have instead been required to buy tariffed services from the ILEC, or deal with competitive suppliers.[90]

Fixed wireless has become an ideal solution for mobile carriers seeking to backhaul traffic from their cell sites to other parts of their networks. Fixed wireless providers have begun marketing their services directly to wireless providers for precisely this reason.[91] One such provider notes that fixed wireless backhaul to mobile wireless providers offers "operating costs

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[87] *See USTA II*, 359 F.3d at 575, 579 (absence of UNEs in wireless markets has "obviously not made competitive entry uneconomic"; "wireless growth has been 'remarkable'" and "wireless prices have been steadily declining."). According to the long distance carriers, the Commission's EELs and commingling restrictions have resulted in limited use of UNEs to transport long-distance traffic. *See, e.g.*, AT&T Petition for Rulemaking at 14-15, CC Docket No. 01-338 *et al.* (FCC filed Oct. 16, 2002) ("IXCs and competitive carriers must rely on Bell special access in order to provide both exchange access and local service."); AT&T, *Transport UNEs are a Prerequisite for the Development of Facilities-Based Local Competition* at 10, *attached to* Ex Parte Letter from Joan Marsh, AT&T, to Marlene Dortch, FCC, CC Docket No. 01-338 *et al.* (Oct. 8, 2002) ("98% of AT&T's DS1 customer loops/EELs are leased from ILECs under their Special Access tariffs; only 2 percent are leased as UNEs."); Comments of the Competitive Telecommunications Association at i, CC Docket No. 96-98 (FCC filed Apr. 5, 2001) ("Requesting carriers, including those that carry a 'significant amount of local exchange traffic,' have been forced to order EEL-equivalent services (*e.g.*, T1 loops, multiplexing and transport) out of the ILECs' tariffs as higher-priced special access services.").

[88] *See Triennial Review Order* ¶¶ 24-25.

[89] *See USTA II*, 359 F.3d at 575.

[90] *See* Comments of AT&T Wireless, *Notice, Request for Comments on Deployment of Broadband Networks and Advanced Telecommunications*, NTIA Docket No. 011109273-1273-01 (NTIA filed Dec. 19, 2001) ("[W]ireless carriers expend significant sums to lease transport facilities from incumbent LEC special access tariffs.").

[91] J. Continenza, President and CEO, Teligent, presentation before the Comptel/ASCENT Summer Showcase, San Francisco, CA (June 2003) (Fixed wireless can be used for "[c]ost effective backhaul from cell sites to switch."); J. Jacquay, President, Business Markets, XO, *Cutting the Cord: Broadband Wireless*, presentation before the Comptel/ASCENT Summer Showcase, San Francisco, CA (June 2003) ("New solutions are being solicited by the [cellular] industry" because "future [] cellular backhaul demand cannot be met by copper.")

reductions of roughly 25%," and that in Europe, 80 percent of mobile wireless backhaul is provided through fixed wireless connections.[92]

2. High-Capacity Loops

Buyers of high-capacity loops are overwhelmingly concentrated in geographic clusters, and competitive providers accordingly route their fiber networks to meet this concentrated demand. As indicated above, competitive fiber facilities are collocated in 55 percent of ILEC wire centers that account for 80 percent of BOC special access revenues and that contain about 55 percent of all ILEC business lines. *See* § III.A & Table 4, *supra*. As the D.C. Circuit has emphasized, however, evidence of existing fiber is only the beginning of the analysis; the proper competitive analysis looks at competitive facilities already in place, as well as "similar routes" and those "similarly situated with regard to . . . 'barriers to entry.'"[93] In addition, the analysis must look at other competitive alternatives, including special access. When all of these factors are considered, it is clear that competing carriers are able to provide high-capacity loops without access to UNEs, wherever demand for high-capacity services exists.

a. Locations Reached by Competitive Fiber

As demonstrated in § III.A above, competing carriers already terminate their fiber networks in tens of thousands of buildings with many thousands more lying in easy reach. And high-capacity loops can be supplied competitively to any customer in these buildings, at any capacity from DS1 on up. *See* § III.C, *supra*. There can be no serious argument, therefore, that competition has not arrived at specific, ascertainable locations that are actually served by competing fiber. In addition, the Commission has previously found that the existence of fiber-based collocation in a wire center provides strong evidence that competing carriers are using that fiber to provide high-capacity loops.[94] The Commission has also recognized, however, that fiber-based collocation is a "conservative measure of competition," because it "fails to account for the presence of competitors that . . . have wholly bypassed incumbent LEC facilities."[95]

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[92] Dean M. Johnson, CEO, First Avenue Networks, *Mobile Backhaul Using 39 GHz Spectrum* at 4, 20 (Oct. 2003).

[93] *USTA II*, 359 F.3d at 575.

[94] *See, e.g.*, *Pricing Flexibility Order* ¶ 104 ("[I]t seems likely that a new market entrant would provide channel terminations through collocation and leased LEC facilities only on a transitional basis and will eventually extend its own facilities to reach its customers. It also seems likely, therefore, that the extent to which competitors have collocation arrangements in an MSA is probative of the degree of sunk investment by competitors in channel terminations between the end office and the customer premises throughout the MSA."); *Triennial Review Order* ¶ 370 ("fiber rings are often deployed to maximize the ability of competitors eventually to deploy loop facilities to connect directly buildings and customers to the transport fiber ring, without accessing unbundled loops at an incumbent LEC central office.").

[95] *Pricing Flexibility Order* ¶ 95, 104.

b. Large Enterprise Customers

"Large enterprise" customers are typically defined to include Fortune 1000 companies and large public institutions.[96] This is considered the most valuable segment of the telecom industry, representing $50 billion in annual revenues.[97] Most of these revenues are derived from long distance voice and data services.[98] These customers also make up the bulk of retail demand for high-capacity services – for example, in the case of Verizon, more than 85 percent of retail sales of high-capacity services are made to large business customers.[99]

Given the nature of services that large enterprise customers demand, this segment of the market has traditionally been dominated by the major long-distance carriers. Today, AT&T, MCI, and Sprint collectively control more than half of the large enterprise market,[100] and are the "primary" service provider for nearly three-quarters of large corporate accounts.[101] The top three

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[96] *See, e.g.*, R.D. Lynch, *et al.*, Lehman Brothers, *Enterprise Telecom Services* at 3 (Nov. 11, 2003) ("*Lehman Enterprise Report*") (large enterprise market has "Fortune 1,000 focus"); *Triennial Review Order* ¶ 129 ("Large enterprises demand extensive, sophisticated packages of services. Reliability of service is essential to these customers, and they often expect guarantees of service quality."); *Applications of NYNEX Corporation Transferor, and Bell Atlantic Corporation Transferee, for Consent to Transfer Control of NYNEX Corporation and Its Subsidiaries*, Memorandum Opinion and Order, 12 FCC Rcd 19985, ¶ 53 (1997) (noting a distinct market for the provision of service to large business/government users).

[97] *See Lehman Enterprise Report* at 3.

[98] D. Barden, *et al.*, Banc of America Securities, *Verizon Communications Inc.* at 3 (Jan. 16, 2004) ("[L]arge enterprise customers spend substantially more on long distance voice and data service than they do on local service.").

[99] *See* Bruno Declaration ¶ 6, *attached to Verizon July 2 Ex Parte*; *Verizon July 2 Ex Parte* at 22.

[100] J. Bazinet, *et al.*, JP Morgan, *MCI Inc. – Initiating Coverage with Overweight* at 4 (Sept. 20, 2004) (The large enterprise market is characterized by "[t]wo carriers [AT&T and MCI] with 50% of market."); *Lehman Enterprise Report* at 3 (The large enterprise market is "[d]ominated by AT&T, MCI, and Sprint."); *see also* J. Bazinet, *et al.*, JP Morgan, *MCI Inc. – Initiating Coverage with Overweight* at 2 (Sept. 20, 2004) ("MCI is one of two players that dominate the $25 billion Large Enterprise communications segment."); *Lehman Enterprise Report* at 15; J. Marcus, Probe Group, *Frame Relay versus IP VPN Markets in North America* at 8 (June 2003) (AT&T, MCI, Sprint, Qwest and Level 3 "continue to serve the majority of the enterprise market."); J. Bazinet, *et al.*, J.P. Morgan, *AT&T: Fundamental Pressures Too Hard to Overcome* at 3 (Nov. 7, 2003) (AT&T's "brand and client roster are unmatched, and its network, sales force, global presence and product breadth give the company a meaningful advantage over competitors."); Bill Hannigan, President, AT&T, *AT&T Business Overview: The Networked Enterprise*, presentation at the AT&T Analyst Day, at 14 (Feb. 25, 2004) ("100% of S&P 500 are AT&T customers"); AT&T News Release, *AT&T Response Statement – DJIA* (Apr. 1, 2004) (AT&T has an "unrivaled base of enterprise customers.").

[101] According to a Merrill Lynch Capital Markets survey, the big three IXCs are the primary telecom service providers for 73 percent of corporate accounts – 35 percent, 24 percent, and 15 percent, respectively. A. Quinton, *et al.*, Merrill Lynch, *The Telecommunicator – WorldCom Survey Results – Industry Implications of Current Customer Thinking* at 2 (Feb. 6, 2003) ("Our survey results indicate that domestically AT&T has the highest penetration as the primary telecom services provider for corporate customers serving 35% of the enterprise market. WorldCom (through WorldCom, MCI, and UUNet) is the primary provider for 24% of the corporate accounts. Sprint comes in third with 15% market share. We estimate 2003 enterprise revenues at AT&T of $25.2B (AT&T Business Services) and $6.0B at Sprint (Global Markets total less $2.6B of consumer LD revenues.) Based on its last reported quarterly data for WorldCom Group, less wireless resale, WorldCom's equivalent annual revenue stream, last reported, stood at around $18.5B.").

companies provide 80 to 90 percent of the long-distance services sold to enterprise customers.[102] They also control approximately three quarters of the market for packet-switched data services such as ATM and Frame Relay,[103] which is now the biggest single telecom expenditure by large enterprise customers.[104] The big three are also the major providers of other specialized high-speed data services provided to business customers, such as IP VPN.[105] Many other carriers compete in this market segment as well, however, such as Level 3, Qwest, and XO.

This competition is quite sufficient to establish, without more, that healthy competition in the enterprise market does not depend on UNEs supplied by ILECs. But in any event, the competitive providers themselves say that it doesn't. AT&T tells investors that its own network "touches virtually all Fortune 1,000 Companies,"[106] and that its core network extends "all the way to the customer premises."[107] Royce Holland, the former CEO of Allegiance and founder of MFS, has stated that "[t]he large corporate enterprise market . . . is all but irrelevant in the debate over competition policy because *there are no bottleneck facilities*."[108]

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[102] M. Richtel, *Market Place: Governance Issues Raised Sprint-Boeing Pact*, N.Y. Times at C1 (Dec. 4, 2003) (citing Patrick Comack, telecom analyst, Guzman & Co: "Sprint has about 10 percent of the long-distance enterprise market. AT&T is the biggest, with nearly half the market, and MCI is in between, he said.").

[103] A report by Schwab Soundview Capital Markets finds that, as of January 2004, AT&T, MCI, and Sprint together controlled 79 percent of the frame relay market and 60 percent of the ATM market. And because the frame relay market is much larger than the ATM market, these companies' share of the combined market for broadband services provided to large businesses is approximately 75 percent. *See* M. Bowen, *et al*., Schwab Soundview Capital Markets, *AT&T Corp*. at 3 (Jan. 21, 2004). In 2003, IDC estimated that total frame relay revenues were $7.44 billion while total ATM revenues were $1.98 billion. *See* R. Kaplan, IDC, *U.S. Frame Relay Services Forecast, 2002-2007* at Table 2 (Mar. 2003); R. Kaplan, IDC, *U.S. ATM Services Forecast, 2002-2007* at Table 2 (Mar. 2003); J. Duffy & M. Martin, *Who Says the Bells Aren't Spending?*, Network World (Mar. 10, 2003) ("[A] key motivation for RBOCs to offer long-distance is the requirement that Hogue described: the need for frame relay service nationwide. Currently, interexchange carriers AT&T, Sprint and WorldCom dominate that multibillion-dollar market. '[The RBOCs have] really been shut out of the most lucrative part of the frame relay business, and that's the long-haul portion,' says Curtis Price, an analyst at Stratecast Partners."); David Dorman, Chairman and CEO, AT&T, presentation before the Credit Suisse First Boston Media and Telecom Week, at 5 (Dec. 11, 2003) (AT&T is the nation's "largest private line/frame relay/ATM provider.").

[104] M. Bowen, *et al.*, Schwab Soundview Capital Markets, *AT&T Corp.* at 2 (Jan. 21, 2004) ("ATM and frame relay services constitute the majority of telecom spending by businesses."); R. Kaplan, IDC, *U.S. Packet/Cell-Based Services Market Forecast and Analysis, 2000-2005* at 1 (Mar. 2001) (ATM and Frame Relay accounted for over 96 percent of revenues in the packet/cell-based services market in 2000).

[105] *See, e.g.*, H. Goldberg, In-Stat/MDR, *VPNs Take a New Look: Trends in the US IP VPN Services Market* at Table 5 (Jan. 2004); Forrester Research, *VPN Sales are Strong, With AT&T in the Lead*, http://www.forrester.com/Research/Document/Excerpt/0,7211,34903,00.html (excerpt of report by M. Lopez, *et al.* published Sept. 20, 2004) ("Almost 90% of the 116 large enterprises that Forrester interviewed are using VPNs today. Similar to last year, AT&T ranked as the top provider for VPN sales, with almost double the percentage of its nearest competitor."); *see also* L. Starr, Probe Research, *The Enterprise Market* at 9, Chart 2 (Dec. 2003) (Probe Research estimates that this market opportunity represented more than $2.7 billion in revenues in 2003, growing to nearly $7 billion by 2008.).

[106] David Dorman, Chairman and CEO, AT&T, presentation before the Credit Suisse First Boston Media and Telecom Week, at 5 (Dec. 11, 2003).

[107] AT&T News Release, *AT&T Introduces New Business Local Access Offer for Large Companies, Government Agencies* (Apr. 16, 2003).

[108] *Allegiance CEO Urges Regulators to Stay the Course*, TR Daily (Dec. 4, 2003).

In any event, competitive providers will almost always be able and eager to extend their networks to large enterprise customers that aren't already served by competitive fiber.[109] These customers "demand extensive, sophisticated packages of services," and "prefer a single provider capable of meeting all their needs at each of their business locations which may be in multiple locations in different parts of the city, state or country."[110] They generate enormous revenues,[111] which, as the Commission has already found, "provide a large incentive to suppliers to build their own facilities where possible, and carry these customers' traffic over their own networks."[112]

c. Access to Long-Distance Networks

As already noted, the Commission's UNE rules gave long-distance carriers limited rights to entrance-facility and transport UNEs. The rules were essentially the same on the line-side of the ILEC switch, where high-capacity connections link long-distance carriers to special-access customers.[113]

Interexchange carriers such as AT&T, MCI, WilTel, Level 3, Global Crossing, and others have long provided long-distance service without using UNEs. In some instances, they have done so using their own facilities, and in some instances they have used special access. But regardless, there is no question these carriers can provide long-distance service without UNEs. Some of these long-distance carriers operate their own, extensive high-capacity local access and transport facilities. *See* Table 18 & Table 1, *supra*. To reach wire centers and customers not situated on their own networks, they also routinely use networks operated by CLECs. *See* Table 11, *supra*.[114] Where necessary, they also use tariffed special-access services. Interexchange carriers typically bundle special access with other services for sale to end users; they also use special access to transport switched traffic that is consolidated from many smaller customers.[115]

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[109] *See, e.g.*, WilTel, *Market Segments: Enterprise: Enterprise Solution Model*, http://www.wiltel.com/market_segments/content/enterprise/solution_model.htm ("WilTel knows that nothing happens until our network and your facilities meet. If our 12,000 existing locations and methods for doing that aren't enough, we'll bring the network directly to you."); Looking Glass, *Design and Construction*, http://www.lglass.net/products/design.jsp ("Looking Glass' SolutionsGLASS leads the way in metropolitan fiber optic facility design and construction. With our highly specialized and dedicated professionals experienced in engineering, project management and construction on your team, your project is in the capable hands of industry leaders."); OnFiber, *Solutions Overview*, http://www.onfiber.com/interior.asp?section=solutions (OnFiber has the "[a]bility to build virtually anywhere in the contiguous U.S." including an "in-house construction management, project management, fiber acquisition and optical engineering team.").

[110] *Triennial Review Order* ¶¶ 129, 302.

[111] *Lehman Enterprise Report* at 3 (large enterprise market generates approximately $50 billion in annual revenues).

[112] *Triennial Review Order* ¶ 129.

[113] *See Triennial Review Order* ¶¶ 595-600.

[114] *See also* J. Hodulik, *et al.*, UBS, *Paying to Play: How Access Charges Determine the Winners and Loser in Telecom Services* at 22 (Apr. 2, 2004) ("When possible, the IXCs source local connectivity from independent competitive access providers such as Time Warner Telecom and ICG Communications.").

[115] J. Hodulik, *et al.*, UBS, *Paying to Play: How Access Charges Determine the Winners and Loser in Telecom Services* at 21 (Apr. 2, 2004) (Special access "circuits are integrated into IXC data service offerings but are also used for voice services in lieu of traditional switched access.").

AT&T has previously informed the Commission that "98% of AT&T's DS1 customer loops/EELs are leased from ILECs under their Special Access tariffs; only 2 percent are leased as UNEs."[116]

Table 18. Local Fiber Networks of IXCs That Supply Dark Fiber

Company	MSAs with Operational Networks
WilTel	Atlanta, Baltimore, Boston, Chicago, Dallas, Houston, Los Angeles, Miami, Minneapolis, New York, Philadelphia, Phoenix, San Francisco, San Jose, Seattle, St. Louis, and Washington, D.C.
Level 3	Atlanta, Baltimore, Boston, Chicago, Cincinnati, Dallas, Denver, Detroit, Houston, Los Angeles, Miami, New York, Omaha, Orlando, Philadelphia, Phoenix, Portland, San Diego, San Francisco, San Jose, Seattle, St. Louis, Stamford, Tampa, Washington, D.C.
Global Crossing	New York, Philadelphia, Washington, D.C., Atlanta, Miami, Dallas, Chicago, San Francisco, San Jose, Los Angeles
Qwest	Albany, Austin, Baltimore, Boston, Chicago, Cincinnati, Cleveland, Columbus, Dallas/Ft. Worth, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, New York, Philadelphia, Pittsburgh, Sacramento, San Antonio, San Diego, San Francisco, San Jose, St. Louis, Washington, D.C., White Plains

Sources: See Appendix H.

The high-end of the long-distance market is fully competitive, and there are no signs that the availability or cost of obtaining high-capacity loops is impeding competition, or could.[117] As noted above, notwithstanding Bell Company entry into the market, AT&T, MCI, and Sprint provide 80 to 90 percent of the long-distance services sold to enterprise customers, and remain the primary telecom service providers for 73 percent of corporate accounts.

Competing carriers as a whole now account for a significant share of special access services provided to end-user customers. Even according to FCC data that fail to account for several billion dollars in self-provision by interexchange carriers like AT&T and MCI, competing carriers now control more than 36 percent of special access revenues provided to end-user customers;[118] making any reasonable allocation for that self-provisioning boosts the total to at least 50 percent.[119]

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[116] *See* AT&T, *Transport UNEs Are a Prerequisite for the Development of Facilities-Based Local Competition* at 10 (Oct. 7, 2002), *attached to* Ex Parte Letter from Joan Marsh, AT&T, to Marlene Dortch, FCC, CC Docket Nos. 01-338, *et al.* (Oct. 8, 2002).

[117] S. Flannery, *et al.*, Morgan Stanley, *Strong Showing for Bells in Annual Corporate Survey* at 31 (June 22, 2004) ("Long distance remains intensely competitive . . . survey results show that LD is the most competitive marketplace, with clear evidence of commoditization and fragmentation."); M. Rollings, *et al.*, Citigroup Smith Barney, *SBC Communications: Analyst Day Affirms Strategy to Trade N/T Margins to Improve L/T Prospects* at 3 (Nov. 13, 2003) ("LD is a commodity service on a stand-alone basis."); S. Flannery, *et al.*, Morgan Stanley, *AT&T: Competition Intensifies on All Fronts* at 3 (Dec. 15, 2003) (At "the high end of the [long distance] market . . . pricing among the large carriers has become very competitive.").

[118] *See Telecommunications Industry Revenues Report* at 18, 19, 21 (Table 6, Line 406) (BOCs earn $6.083B from local private line and special access service; CLECs earn $2.074B; toll carriers earn $1.412B).

[119] UBS estimates that AT&T self-provides 25% of its special access and that MCI self-provides about 10% of its special access, and these carriers spend $5.4B and $7B, respectively, on special access from ILECs. This

d. Locations Reached by Other Competitive Alternatives

As demonstrated above, most business customers located within wire centers with 5,000 or more business lines are within easy reach of competitive fiber. These customers can also be served by a number of other competitive alternatives – fixed wireless, cable, and special access.

Fixed Wireless. As described above, wireline CLECs, cable operators, and third-party suppliers are all now using fixed wireless links to link existing fiber networks to nearby customers at off-network locations. The Commission has certainly allocated and assigned abundant amounts of spectrum for the provision of fixed wireless services. Fixed wireless carriers are now operating in the licensed 24 GHz and 39 GHz bands, as well as in the unlicensed 5.8 GHz band. Collectively, there is at least 2.9 GHz worth of licensed spectrum allocated to these services,[120] which is vastly underutilized at present, and in no danger of being exhausted even as usage grows.[121] A December 2003 study by In-Stat/MDR found that 40 percent of "enterprises" (businesses with 1,000 or more employees), 29 percent of the "middle market" (businesses with between 100 and 999 employees), and 23 percent of small businesses (business with 5-99 employees) were currently using fixed wireless for some high-capacity services, and that another 54 percent, 44 percent, and 35 percent, respectively, plan to use fixed wireless within the next 12 months.[122] As these totals demonstrate, and as discussed above, early technical shortcomings with fixed wireless have now been overcome.

Cable. Cable networks provide yet another layer of geographic coverage. Either directly or through an affiliate, each of the nation's major cable operators is now actively pursuing large business customers, both by deploying fiber in urban areas, and by extending their hybrid fiber/coaxial networks to provide cable modem services to business locations. *See* Table 19. Based on information contained on their websites, cable companies appear to be offering service to business customers in at least 90 MSAs.[123]

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means that these carriers self-provide approximately $1.8B and $800M, respectively, of special access service. *See* J. Hodulik, *et al.*, UBS, *Paying to Play: How Access Charges Determine Winners and Losers in Telecom Services* at 27 (Apr. 2, 2004). More recently, UBS noted that MCI told investors it was providing 28% of its high-capacity circuits on-net, which would more than double the amount of MCI's self-provision. *See* J. Hodulik, *et al.*, UBS, *Long Distance Update: No Sign of Improvement in Business Market* at 5 (May 28, 2004).

[120] *See* Wireless Competition Bureau, FCC, *LMDS Band Allocation*, http://wireless.fcc.gov/auctions/data/bandplans/lmds.pdf (1300 MHz allocated); Wireless Competition Bureau, FCC, *39 GHz Band Allocation*, http://wireless.fcc.gov/auctions/data/bandplans/39band.pdf (1400 MHz allocated); M. McCormack, *et al.*, Bear Stearns/TMNG, *Wireless Broadband: The Impact of 802 Technology* at 34, Exhibit 22 (June 2004) (200 MHz allocated for MMDS services). In addition, fixed wireless providers are using the 200 MHz of spectrum in the 5.8 GHz unlicensed band, as well as other unlicensed bands. *See id.*

[121] *See* C. Larsen, *et al.*, Prudential Equity Group, *Wireless Services: CTIA Trade Show Take-Aways* at 2 (Mar. 24, 2004) (Spectrum "like MMDS and ITFS" is "currently lying fallow.").

[122] *In-Stat/MDR Private Line Report* at 19, Tables 9 & 10.

[123] *See* Cox Business Services, *Carrier Markets*, http://www.coxbusiness.com/carriermarkets.pdf (carrier services in 23 MSAs); Lightpath, *About Lightpath*, http://www.lightpath.net/Interior7.html (business service in 1 MSA); Comcast Commercial Services, *Our Network*, http://www.comcastcommercial.com/index.php?option=content&task= view&id=4&Itemid=34 ("Presence in 22 of the top 25 US markets"); Time Warner Telecom, *Dedicated High Capacity Services*, http://www.twtelecom.com/Documents/Resources/PDF/MarketingCollateral/

Analysts estimate that nearly 60 percent of "small- to medium-sized businesses (SMB) are located within a few hundred feet of the local hybrid fiber/coaxial network,"[124] and that roughly 25 percent already have a cable drop.[125] And cable operators have been rapidly expanding their networks to make service even more widely available.[126] A recent study by In-Stat/MDR found that 41 percent of "enterprises," 32 percent of "middle market" businesses, and 44 percent of small businesses were using cable modem service in their main offices for some high-capacity services.[127] An increasing number of business customers are using cable modem service in lieu of traditional special access and private line services.[128]

1701.1DedicedHighCapac.pdf (Time Warner Telecom serves 41 MSAs); Road Runner Business Class, *National Presence*, http://www.rrbiz.com/RoadRunner/index.asp?sid=1 (Road Runner Business Service in 46 MSAs); Charter Business Networks, http://www.charter-business.com/default.htm (business service in 35 states); TelCove, *Fiber Infrastructure*, http://www.telcove.com/network/090304%20Network%20Infra.pdf (TelCove, formerly Adelphia Business Solutions, offers service in 48 MSAs).

[124] J. Shim & R. Read, Credit Lyonnais Securities, *The U.S. Cable Industry – Act I* at 196 (Nov. 20, 2002) (estimating six million SMBs within a few hundred feet); *see also* K. Burney, In-Stat/MDR, *The Big Comeback? Excerpts from 'Business Broadband in a Changed Economy'* at 2, 4 & Fig. 2 (May 2002) (there are an estimated 10.5 million small and medium businesses nationwide (2.2 million with 5-99 employees, 85,000 with 100-999 employees, and 8.2 million characterized as small office/home office)); Citigroup Smith Barney, *Cable: Capitalizing on the SME Opportunity; Detailed Note* (June 4, 2003) (30 to 50 percent of the small- and medium-enterprise market is located within 50 to 100 feet of existing cable modem networks).

[125] J. Shim & R. Read, Credit Lyonnais Securities, *The U.S. Cable Industry – Act I* at 196 (Nov. 20, 2002) (estimating 2.5 million SMBs passed by existing cable infrastructure); D. Sweeney, *Cable's Plumb Position*, America's Network (July 1, 2002) (Jedai Networks, which develops equipment "intended to enable [cable] MSOs to serve business customers," estimates "that roughly 25% of businesses already have a cable drop, including many in downtown office buildings.").

[126] *See, e.g.*, D. Chang, EVP, Finance & Strategy, Charter Communications, presentation before the JP Morgan High Yield Conference, at 23 (Feb. 2, 2004) (Charter is moving "'up-market' to compete in Enterprise RFP environment"); Comm. Daily at 7 (Feb. 2, 2004) (RCN "[s]igned several agreements to expand its business" to provide "voice, video, data, business cable, Internet access, transport," to "customers including universities, hospitals, and the financial and legal industries."); J. Hayes & B. Stemper, Cox Communications, presentation before the UBS Media Week Conference, at 23 (Dec. 2003) (noting that one of the major plans for Cox Business Services in 2004 was to "[e]xpand [the] capabilities of the HFC infrastructure.").

[127] *In-Stat/MDR Private Line Report* at 19, Tables 9 & 10.

[128] *See, e.g.*, C. Munroe, IDC, *U.S. Private Line Services Forecast and Analysis, 2002-2007* at 1 (Dec. 2003). (Special access revenues are declining "due to continued decline in price on a per-megabit basis, as well as competition from broadband circuits in the form of DSL and cable modem adoption by enterprises."); *In-Stat/MDR Private Line Report* at 12 ("As broadband offerings penetrate businesses in more ways, including in home offices, they will become a more compelling replacement to good, ole' private lines.").

Table 19. Cable Serving Business Customers		
	Fiber	**Cable Modem**
Cablevision	"Lightpath owns, installs and operates its own advanced fiber-optic network facility, comprising over 10,000 route miles of fiber-optic cable that connects . . . to more than 1500" buildings	Business Class Optimum Online for small businesses offers connection speeds up to 10 Mbps downstream and 1 Mbps upstream. "[T]he business sector opportunity has 'actually helped us build the network into the business areas and business parks.'"
Time Warner	"We've got an infrastructure there that is just ripe for commercial services. . . .We pass 1.2 million businesses . . . .'" "Delivering cost effective, high capacity access solutions to several Fortune 500 customers." Provides service to 149,000 business customers as of the end of 2Q04.	According to the company, "'[c]able is not incredibly difficult to get to the business,'" and "'[m]ost RBOCs, CLECs and ILECs have ignored that space.'" "[V]iews the SMB market as a high-growth opportunity." "We do have an opportunity to go more aggressively after the enterprise business"
Charter	Moving "'up-market' to compete in Enterprise RFP environment" 9 percent of business subscribers are medium or large businesses.	Business Internet Service is designed for "a small organization seeking a cost-effective, reliable connection to the Internet." "[O]ver 600,000 small- and medium-sized businesses located within reach of our networks"
Comcast	"Comcast Commercial Services leverages the massive network of our parent company. This allows you to have managed access on a carrier class transport network designed for broadband applications. It's reach is broad and deep, with capacity in dense urban, sprawling suburban and even many rural areas others don't reach." "Comcast has been delivering service to commercial organizations since 1995 and has thousands of customers leveraging the Comcast network for critical business applications. Comcast delivers unique service capabilities on our own national network, which allows you to have reliable service and competitive rates."	Targets "SMBs with 1-100 employees," "Non-profit orgs, schools, government," and "SMBs and Enterprises with telecommuters."
Cox	"over 100,000 customers in over 18 markets" More than 320,000 businesses with "a total telecom spend of roughly $3.3 billion annually" lie within 100 feet of Cox's network Expected to "reach more than 25% of businesses within its franchise" at YE04	"[S]erves 19 of the Cox cable markets, covering more than 90 percent of Cox's overall footprint nationally, marketing basic data and video services aggressively to small- and medium-sized businesses the company can easily serve with current network connections."
RCN	"Signed several agreements to expand its business" to provide "voice, video, data, business cable, Internet access, transport," to "customers including universities, hospitals, and the financial and legal industries."	
Sources: See Appendix H.		

Special Access. Competing carriers can also use special access service to provide connections between end users and the competing carrier's network, in virtually any location throughout the country, to customers large and small. As described in § I.B, competing carriers are serving approximately 60 million voice-grade equivalent lines using special access circuits purchased from ILECs. Competing carriers are using special access to serve all kinds of customers, in both small and large markets. Verizon has compiled evidence showing that competing carriers purchasing special access are using it to serve a wide spectrum of small businesses that includes antique dealers, bookstores, dry cleaners, florists, gas stations, and hair dressers, to name just a few.[129]

The evidence is clear that special access provides a viable alternative to UNEs. In fact, to the extent that competing carriers rely on ILEC facilities for high-capacity circuits, they obtain far more of those circuits as special access as opposed to unbundled elements. In the case of Verizon, for example, 93 percent of DS1 loops and 98 percent of the DS3 loops that carriers purchase from Verizon, which they then use to serve their own customers, are sold as special access as opposed to as unbundled elements.[130] In SBC's region, 77 percent of DS1 loops and 97 percent of the DS3 loops that carriers purchase from SBC are sold as special access as opposed to unbundled elements. In BellSouth's region, 70 percent of DS1 loops and 97 percent of the DS3 loops that carriers purchase from BellSouth are sold as special access as opposed to unbundled elements. In these three regions combined, CLECs have purchased a total of only 1,500 DS3 loops either as standalone UNEs or as EELs.

Some carriers are in fact using special access services exclusively (rather than UNEs) to reach their customers, or have stated that special access is all they need from ILECs. For example, Time Warner – one of the most successful competing providers in the country – recently announced that it "does not rely upon UNEs," because it earns the "majority of our revenue . . . exclusively through our own network facilities," and in "instances where we need services from ILECs to connect our remote customers to our vast fiber network, we purchase those under special access tariffs or under agreements with the ILECs."[131] US LEC states that it is "successfully executing its business plan and, importantly … [is] well positioned to address the uncertainty around UNE services," because "over 90% of [its] customer T-1s are not UNE based."[132] Pac-West has reassured investors that it "anticipates no direct impact from [the] recent FCC Triennial Review actions" because "Pac-West does not employ UNEs in its current network architecture in any significant way."[133] These statements confirm what ALTS stated in

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[129] *See Verizon July 2 Ex Parte* at 18-19, Attachment 14.

[130] *See* Verses/Lataille/Jordan/Reney Declaration ¶¶ 50-51, *attached to Verizon July 2 Ex Parte*; *Verizon July 2 Ex Parte* at 19.

[131] Time Warner Telecom Press Release, *Time Warner Telecom Not Impacted by UNE Ruling* (June 10, 2004) (quoting Paul Jones, SVP, general counsel and regulatory policy, Time Warner Telecom).

[132] US LEC Press Release, *US LEC Achieves $91.6 Million in Revenue and $12.9 Million of EBITDA* (July 29, 2004).

[133] Pac-West Telecomm Press Release, *Pac-West Telecomm Anticipates No Direct Impact from FCC Triennial Review Actions* (June 10, 2004); *see also* Ex Parte Letter from R. Rindler, Counsel for Pac-West, to Marlene Dortch, FCC, CC Docket Nos. 01-338 *et al.* (Sept. 7, 2004) ("Pac-West serves all customers via facilities obtained from other carriers, with much of that being obtained from the ILECs").

its 2003 report on the state of local competition: "CLECs that rely primarily on old-fashioned special access (instead of unbundled network elements) have logged impressive growth."[134]

[134] ALTS, *The State of Local Competition 2003* at 5 (Apr. 2003).

APPENDICES

APPENDIX A. MASS-MARKET BROADBAND COMPETITION: SEPTEMBER 2004

APPENDIX B. PRICE COMPARISONS

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APPENDIX A. MASS-MARKET BROADBAND COMPETITION: SEPTEMBER 2004

This appendix provides an overview of competition in the provision of broadband services. It demonstrates that cable companies continue to dominate the provision of mass-market broadband service, while at the same time competition is also increasing from a number of other technologies. As a recent study finds, this is true not only for residential customers, but also for small-business customers for whom cable has become the most used broadband technology and who also rely heavily on alternative technologies such as fixed wireless and satellite.

I. Cable Operators Dominate the Broadband Mass Market

Recent data show that cable continues to dominate the broadband mass market. According to the Commission's latest *High-Speed Services Report*, as of December 2003, cable controlled nearly *two-thirds* of all high-speed lines provided to residential and small-business customers,[1] which is the segment of the broadband market that cable operators target.[2] As of that same date, cable also controlled approximately *85 percent* of the most rapidly growing segment of mass-market broadband lines – those capable of over 200 kbps in both directions.[3] Although the Commission's data are current only as of December 2003, more recent data show that cable has continued to maintain its lead over DSL through the second quarter of 2004, despite significant price decreases by DSL providers.[4] *See* Table 1.

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[1] Ind. Anal. & Tech. Div., Wireline Competition Bureau, FCC, *High-Speed Services for Internet Access: Status as of December 31, 2003* at Table 3 (June 2004) ("*June 2004 High-Speed Services Report*").

[2] *Compare June 2004 High-Speed Services Report* at Table 3 (Cable provides 16,416,364 high-speed lines to residential and small-business customers) *with June 2004 High-Speed Services Report* at Table 1 (Cable provides a total of 16,446,322 high-speed lines).

[3] *See June 2004 High-Speed Services Report* at Table 4. Residential and small-business high-speed lines capable of over 200 kbps in both directions represented 89 percent of all residential and small-business high-speed lines added in 2003, and 92 percent of all high-speed lines added during that same period. *See id.* at Tables 1, 3 & 4.

[4] *See, e.g.*, C. Moffett, *et al.*, Bernstein Research Call, *Broadband Update: Narrower "Availability Gap" Points to RBOC/Cable Share Stabilization* at 1 (Aug. 25, 2004) ("*Aug. 2004 Bernstein Broadband Update*") ("[W]e disagree with the conclusion that the Bells have 'pulled ahead' in the *consumer* broadband race. . . . After adjusting for the business/residential split for DSL, we estimate that cable took 54% of net additions, and 62% of gross additions."); *id.* at 2 ("[D]espite sizable price cuts by the RBOCs in May 2003, the relative shares of the overall installed base have barely budged, with cable continuing to lay claim to approximately 67% of residential broadband subscribers."); G. Campbell, *et al.*, Merrill Lynch, *Everything over IP: VoIP and Beyond* at 2 (Mar. 12, 2004) (*Merrill Lynch, Everything over IP*") ("Thanks to price-cutting, DSL made modest inroads into cable's dominant position in the U.S. market.").

Table 1. Cable Modem and DSL Subscriber Growth: 1H 2004					
DSL			**Cable**		
	Net Adds 1H 2004	**Total Subs. 2Q 2004**		**Net Adds 1H 2004**	**Total Subs. 2Q 2004**
SBC	762,000	4.3 million	Comcast	721,000	6.0 million
Verizon	625,000	2.9 million	Time Warner	341,000	3.7 million
BellSouth	276,000	1.7 million	Cox	259,000	2.2 million
Qwest	216,000	853,000	Charter	183,000	1.7 million
Sprint	79,000	383,000	Cablevision	122,000	1.2 million
Other*	127,000	1.1 million	Other*	364,000	2.0 million
Total	**2.1 million**	**11.3 million**	**Total**	**2.0 million**	**16.9 million**

*Other DSL providers are ALLTEL, Citizens Communications, Cincinnati Bell, CenturyTel, and Covad. Other cable modem providers are Adelphia, Mediacom, Insight Communications, and RCN.

Source: M. Rollins, *et al.*, Citigroup, *Telecom Tidbit: Updating HSI Share Analysis for Recent 2Q Results* at 4 (Aug. 16, 2004).

Cable also continues to lead DSL in terms of availability and penetration. Cable modem service is now available to at least 87 percent of all U.S. households,[5] and by the end of 2004 will be available to approximately 90 percent of U.S. households.[6] Four of the largest cable companies (Comcast, Time Warner, Cox, and Cablevision) now make cable modem service available to between 95 and 100 percent of their homes passed,[7] and between 26 and 38 percent of these companies' video subscribers now take cable modem service.[8] The Bell companies, by contrast, currently make DSL available to about 75-80 percent of their homes passed,[9] and only between 9 and 17 percent of their residential voice subscribers take DSL.[10]

Cable modem service is available in virtually all of the same markets where DSL is provided. JP Morgan has estimated that no more than 5 percent of U.S. households would be able to receive DSL but not cable modem by the end of 2003.[11] The actual number may well be even lower today, given that JP Morgan assumed that cable modem service would be available to only 76 percent of all U.S. households as of year-end 2003, whereas the actual total today is somewhere between 87 and 90 percent.[12]

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[5] *See Aug. 2004 Bernstein Broadband Update* at 6 (cable broadband available to approximately 94 percent of total cable homes passed).

[6] *See id.* at 6. Comcast will complete its upgrade in the 1.8-million subscriber Bay Area market by Fall 2004, and will "complete its total network build out over the next two quarters." *Id.* at 8-9.

[7] *See, e.g., id.* at 6 & Exhibit 5. *See also* n.6, *supra*.

[8] *See* J. Hodulik, *et al.*, UBS, *High-Speed Data Update for 1Q04* at Chart 5 (May 21, 2004).

[9] *See Aug. 2004 Bernstein Broadband Update* at 7, Exhibit 6 (reporting DSL availability at 80% for SBC, 80% for Verizon, 75% for BellSouth, and 60% for Qwest).

[10] *See* J. Hodulik, *et al.*, UBS, *High-Speed Data Update for 1Q04* at Chart 4 (May 21, 2004).

[11] *See* J. Bazinet, *et al.*, JP Morgan, *Broadband 2003* at Figure 9 (Dec. 5, 2002).

[12] *See id.*; *Aug. 2004 Bernstein Broadband Update* at 6, 8-9.

Broadband competition is thriving for small-business customers just as it is for residential customers.[13] Cable companies have moved rapidly to provide cable modem services to small-business customers. Five of the six largest cable system operators (which, collectively, represent approximately 90 percent of consumer cable modem subscribers) already offer broadband services specifically tailored to small businesses.[14] These cable operators have acknowledged that they can readily reach most small-business customers with their existing infrastructure, and that it makes sense to serve them.[15] Indeed, these cable operators already have been very successful in attracting small-business subscribers.[16] For example, Time Warner Cable's senior vice president of Commercial Services recently stated that "[w]e're continuing to drive this business. . . . It's been a huge driver from the revenue standpoint."[17]

Several studies confirm that small businesses are increasingly turning to cable modem service for their broadband needs.[18] A March 2004 study commissioned by the Small Business Administration, which the CLECs' own trade association has praised as a "well-researched report,"[19] separately analyzed small businesses according to three different segments (those with 0-4 employees, those with 5-9 employees, and those with revenues less than $200,000), and found that "for all three segments penetration was higher for cable modem service than for DSL."[20] A December 2003 study by In-Stat/MDR analyzes small businesses with 5 to 99

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[13] *See* Letter from Dee May, Verizon, to Marlene H. Dortch, FCC, WC Docket Nos. 01-337, 02-33, 98-10, 98-20 at 10-17 (Nov. 13, 2003); *see also* Letter from Edward Shakin, Verizon, to Marlene H. Dortch, FCC, WC Docket Nos. 01-338, 96-98, 98-147, 02-33, 01-337 (Jan. 15, 2003).

[14] *See* J. Shim, Credit Lyonnais Securities, *The U.S. Cable Industry – Act I* at 196-202 (Nov. 20, 2002); Time Warner, *Time Warner Cable*, http://www.aoltimewarner.com/companies/time_warner_cable_index.adp.

[15] *See, e.g.*, *A Snapshot of the Cox Business Strategy*, Interview with Coby Sillers, Vice President and General Manager for Cox Business Services, Xchange Mag. (June 1, 2003), http://www.xchangemag.com/articles/361buzserv3.html (Cox Business reaches "more than 90 percent of Cox's overall footprint nationally, marketing basic data and video services aggressively to small- and medium-sized businesses the company can easily serve with current network connections."); A. Figler, *Turning Businesses into Customers*, Cable World (Dec. 9, 2002) (Ken Fitzpatrick, senior vice president of commercial services for Time Warner Cable: "We've got an infrastructure there that is just ripe for commercial services. . . . We pass 1.2 million businesses.").

[16] *See, e.g.*, J. Reif-Cohen, *et al.*, Merrill Lynch, *Cox Communications: Chasing Profits and the 4 Million Non-Video Homes* at 6 (July 30, 2004) (Cox Business Services has "over 100,000 customers in over 18 markets" and "could continue to scale in 2004 as it expands its network to reach more than 25% of businesses within its franchise."); J. Barthold, *Small Business, Big Money, No Guarantees*, TelephonyOnline (Aug. 12, 2002) (Kevin Curran, senior vice president of marketing and sales for Cablevision Lightpath: Cablevision "can't keep up with demand" for Cablevision's Business Class Optimum Online service for small businesses).

[17] A. Breznick, *Cable Operators Show They Really Mean Business*, Cable Datacom News (Sept. 2004) ("Time Warner officials say they enjoyed a $60 million gain in business sector revenue last year, boosting their overall commercial take by 70%. The MSO now boasts more than 140,000 commercial accounts for its Road Runner Business Class line of services.").

[18] S. Pociask, Telenomic Research, LLC, *A Survey of Small Businesses' Telecommunications Use and Spending* (Mar. 2004) ("*Small Business Administration Study*"); K. Burney, In-Stat/MDR, *The Data Nation: Wireline Data Services Spending and Broadband Usage in the US Business Market; Part Three: Small Businesses (5 to 99 Employees)* (Dec. 2003) ("*In-Stat/MDR Small Business Study*").

[19] ALTS Press Release, *ALTS Applauds SBA's Survey of Competition for Small Business Customers* (Mar. 11, 2004) (statement of ALTS president John D. Windhausen, Jr.).

[20] *See Small Business Administration Study* at 44, 47 (Fig. 32), 48 (Fig. 33), 50 (Fig. 35).

employees and finds that, as of year-end 2003, there were 2.1 million such businesses using cable modems compared to 1.4 million using DSL.[21] A November 2003 study by In-Stat/MDR finds that small offices and home offices (businesses with fewer than 5 employees) subscribe to cable modem service more than twice as often as they subscribe to DSL.[22]

These studies also demonstrate that small businesses use cable modem service far more often than the T-1 services the local telephone companies provide. The Small Business Administration study finds that the penetration of T-1 services among small businesses is only 4 percent, compared to 26 percent for cable modem services.[23] In-Stat/MDR likewise reports low penetration rates of T-1 service among the small-business customers it studied.[24]

The most recent competitive offerings and promotions from DSL and cable operators also demonstrate that there is extensive head-to-head competition across all geographic markets and for all segments of the mass market. In recent months, each of the Bell companies has cut their national DSL prices considerably. *See* Tables 2 & 4. Cable operators have responded with promotional and targeted price reductions, and, more broadly, by increasing data speeds that effectively offer consumers more bandwidth at a lower price than those operators' previous offerings. *See* Table 4.[25] And because these price wars began *after* the *Triennial Review Order*, they also vindicate the Commission's recent decision to phase out line sharing.[26]

Tables 2 and 3 show current broadband offerings over DSL and cable to residential and small-business customers, respectively. The tables reflect the standard prices for high-speed Internet access service – that is, Internet access bundled together with broadband transport. In Table 2, the bottom of the price range reflects prices when the lowest-speed broadband service is purchased together with at least one other service – voice service (local and long-distance) in the case of DSL, and video or voice service in the case of cable.[27] The higher prices in the range are

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[21] K. Burney, In-Stat/MDR, *The Data Nation: Wireline Data Services Spending and Broadband Usage in the US Business Market; Part Three: Small Businesses (5 to 99 Employees)* (Dec. 2003).

[22] *See* K. Burney & C. Nelson, In-Stat/MDR, *The Business Hot Wire!: Data Access in the Commercial and Residential Environments of US Businesses; Part One: Cable Modem Services* at 26, Table 11 (Nov. 2003) (48.5% of SOHO businesses subscribe to cable modem; 17.8 percent subscribe to DSL).

[23] *See Small Business Administration Study* at 44 (Fig. 30); *see also id.* at 47 (Fig. 32), 48 (Fig. 33), 50 (Fig. 35).

[24] *See* K. Burney & C. Nelson, In-Stat/MDR, *The Business Hot Wire!: Data Access in the Commercial and Residential Environments of US Businesses; Part One: Cable Modem Services* at 20, Table 11 (Nov. 2003) (8.5% of SOHO businesses and 25.6% of small businesses use Full T-1 in their main office; 5.9% and 17.3%, respectively, use Fractional T-1; and 48.5% and 43.7%, respectively, use cable modem).

[25] *See also* G. Campbell, *et al.*, Merrill Lynch, *3Q03 Broadband Update: The Latest on Broadband Data and VoIP Services in the U.S. and Canada* at 2 (Nov. 3, 2003) ("*Merrill Lynch 3Q03 Broadband Update*") (cable operators "are increasingly moving 'off the rate card,' with market-specific pricing and increased use of promotional and bundled-price discounts specific to certain markets").

[26] *See Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978, ¶ 263 (2003) ("*Triennial Review Order*"). Of course, competitive providers of DSL service have traditionally accounted for a only a small fraction of the broadband market, particularly for mass-market customers. *See, e.g.*, *June 2004 High-Speed Services Report* at Table 5.

[27] *Merrill Lynch*, *Everything over IP* at Table 2.

for broadband service purchased without one of those other services, or for higher-speed service. In Table 3, the bottom of the price range reflects prices under a one-year contract for the lowest-speed broadband service (with dynamic IP addresses, where available); the higher prices in the range are for higher speeds under a one-year contract.[28] The prices do not factor in the promotional discounts that, as demonstrated in Table 4, both DSL and cable modem providers are now routinely offering their customers.

Table 2. Current Residential Offerings by DSL and Cable Modem Providers

Technology	**DSL**				**Cable Modem**			
Provider	**Verizon**	**SBC**	**BellSouth**	**Qwest**	**Comcast**	**Cablevision**	**Cox**	**Time Warner**
Downstream Bandwidth	1.5 Mbps	384 kbps-3 Mbps	256 kbps-3 Mbps	256 kbps-1.5 Mbps	3 Mbps	3.5 Mbps	4-5 Mbps	3 Mbps
Upstream Bandwidth	384 kbps	128-384 kbps	128-384 kbps	256-896 kbps	256 kbps	1 Mbps	512-768 kbps	384 kbps
Monthly Price	$29.95-$34.95	$26.95-$59.99	$24.95-$64.95	$15.00-$44.99	$42.95-$57.95	$44.95-$49.95	$39.95-$69.95	$44.95-$59.95

Sources: See Appendix H.

Table 3. Current Small Business Offerings by DSL and Cable Modem Providers

Technology	**DSL**				**Cable**		
Provider	**Verizon Business DSL**	**SBC Symmetric DSL**	**Covad TeleSpeed Business DSL**	**AT&T Business Class DSL**	**Time Warner Road Runner Business Class**	**Comcast Business Comm. Comcast Workplace**	**Cablevision Business Class Optimum Online**
Downstream Bandwidth	384 kbps-7.1 Mbps	144 kbps-1.5 Mbps	144 kbps-1.5 Mbps	144 kbps-1.5 Mbps	1-4 Mbps	4-5 Mbps	10 Mbps
Upstream Bandwidth	384-768 kbps	144 kbps-1.5 Mbps	144 kbps-1.5 Mbps	144 kbps-1.5 Mbps	192 kbps-1.5 Mbps	384-512 kbps	1 Mbps
Monthly Price	$39.95-$204.95	$89.99-$289.95	$125.95-$289.95	$149.95-$399.95	$79.95-$399.95	$145-$200	$109.95

Sources: See Appendix H.

[28] The one exception to this is for Covad. The low-end for Covad reflects pricing under a two-year contract; the high-end reflects pricing under a one-year contract; and both exclude a one-time rebate of $150-$584. AT&T also offers a one-time rebate which is not reflected here.

Table 4. Recent Changes in Cable/DSL Competitive Offerings and Promotions		
DSL		
Verizon	Apr. 2004	Began three-month promotion of free Wi-Fi routers to new DSL customers
	June 2004	Raised maximum upstream speeds for the 1.5 Mbps service from 128 kbps to 384 kbps; reduced prices for business DSL for a savings of $30 to $40 a month
	Sept. 2004	Began offering a 3.0 Mbps/768 kbps service
SBC	Sept. 2003	Lowered prices by 10% to $26.95 across its region to customers who sign-up online or purchase DSL within a bundle with a one-year commitment
	Feb. 2004	Replaced a $99.95 high-end offering with 3.0 Mbps/384 kbps service for $44.99
	Apr. 2004	Reduced price for 3.0 Mbps/384 kbps service to $36.99 when purchased with local, long-distance, and wireless service Reinstated promotion of $26.95 per month for download speeds of up to 1.5 Mbps
	June 2004	Increased e-mail storage to 2 GB per account; expanded $26.95 DSL promotion to any new customer with SBC bundle
	Aug. 2004	Announced increase of upload speeds from 128 kbps to 256 kbps, then 384 kbps for 384 kbps-1.5 Mbps download service, and from 384 kbps to 416 kbps, then 512 kbps for 1.5-3.0 Mbps service
BellSouth	3Q 2003	Began offering free first and third months of service
	3Q 2003	Reduced monthly rates to $29.95 and $39.95, when DSL is purchased with unlimited local and long-distance calling
	3Q 2004	Offering free Wi-Fi routers to new DSL customers
	Sept. 2004	Reduced monthly rate of 1.5 Mbps service by $7 per month; new DSL customers will receive a $15 discount per month on any DSL service for the first six months Began six-month promotion for service for as little as $9.95 (256 kbps/128 kbps) and $17.95 (1.5 Mbps/256 kbps) for customers who subscribe to the unlimited long-distance plan
Qwest	2003	Reduced monthly rate by 30 percent to $34.99 when purchased as part of a bundle
	3Q 2003	Reduced monthly modem rental fees from $5 to $2; monthly rate with bundled service now $29.95
CABLE		
Comcast	Sept. 2003	Launched aggressive promotional trial, offering $19.95 for one year to a select group of DSL customers in California, Illinois, and Maryland
	3Q 2003	Offered $19.99 per month (effective for 3 or 6 months) for video customers, or $33.99 per month for non-video customers, in most markets
	Oct. 2003	Announced increased download speed to 3 Mbps from 1.5 Mbps
	July 2004	Announced a new 4 Mbps tier option and an increase in e-mail storage from 10 MB to 250 MB
Time Warner	Oct. 2003	Increase download speed to 3 Mbps from 2 Mbps
	Dec. 2003	Lowered monthly rate in Kansas City, Mo. from $44.95 to $26.95 for one year
	4Q 2003	Currently testing faster upload speeds (512 kbps)
	July 2004	Announced launch of speeds up to 6 Mbps/512 kbps; promoted service for $29.95 per month for six months in New York
Charter	Sept. 2003	Increased download speeds to 2.0 Mbps at no extra charge
	Apr. 2004	Increased download & upload speeds to 3.0 Mbps/256 kbps
Cablevision	June 2004	Began offering bundle of Internet, telephone, and video service to new customers for $89.95
Cox	3Q 2003	Reduced monthly modem rental rate from $15 to $10
	4Q 2003	Rolling out a reduced-priced data product in 7 markets – Northern Va., Kan., New Orleans, Humboldt and Santa Barbara, Cal., Phoenix, and Ga.
	4Q 2003	Plans to add a higher-speed service as part of its tiering strategy
	Aug. 2004	Announced higher data speeds for all three service tiers (up to 5 Mbps download) and lowered the price on the fastest service by $5-$25, depending on the area
Adelphia	Oct. 2003	Increased download speed to 3 Mbps; doubled upload speed to 256 kbps
RCN	Oct. 2003	Increased top download speed to 5 Mbps; doubled download speed of lower-priced tier to 3 Mbps
	July 2004	Announced launch of download speeds of up to 7 Mbps
Mediacom	Jan. 2004	Announced it will double download and upload speeds to 3 Mbps and 256 kbps, respectively, at no extra charge
Sources: See Appendix H.		

Finally, the fact that cable and DSL providers are engaging in aggressive comparative advertising provides additional confirmation that they are competing head-to-head for the same customers in the same markets. For example, Time Warner boasts that its "High Speed Online . . . leaves DSL in the dust."[29] Comcast claims "download speeds up to 2x faster than 1.5 Mbps DSL."[30] Cablevision claims its service "is more than twice as fast as the lowest-priced DSL."[31] BellSouth points out that DSL "provides a dedicated connection to your home to the [] DSL network. Cable modem service shares a connection with other cable modem subscribers."[32] A recent SBC print ad encourages customers to "stop throwing money away on cable and sign up for SBC Yahoo DSL." A Verizon television ad boasts service "that's 13 bucks less than Comcast," and, unlike Comcast includes a pop-up blocker, antivirus software, and modem. Within several weeks of airing this spot, Comcast aired a copycat advertisement – using the same set, format, and body double.[33] According to MINTEL's Comperemedia, telephone companies have also boosted their direct-mail marketing efforts "primarily due to cable companies' more aggressive marketing of packages with cable modem and cable TV services and most recently, phone service."[34]

II. There Is Significant Mass-Market Broadband Competition from Other Sources

The Commission has already recognized that, in addition to cable and DSL, there are providers using numerous additional platforms and technologies that are already competing in or poised to enter the broadband mass market, including power lines, fixed wireless, 3G mobile wireless, and satellite.[35] Indeed, many of these technologies are already being used to provide service offerings that are competitive with DSL and cable modem services, both for residential and small-business customers. *See* Tables 5 & 6. All of these alternatives must be taken into

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[29] Time Warner Cable, *Products & Services: High Speed Online from Time Warner Cable*, http://www.timewarnercable.com/dispatcher/products;jsessionid=0000LZJGUTC4AGS3LJ0T3J34NUY:-1?category=10056&expand=Y&rootCategory=10050&src=0homeHS0.

[30] Comcast, *Features*, http://www.comcast.com/Benefits/CHSIDetails/Slot3PageOne.asp.

[31] Optimum Online, *What Is It?*, http://www.optimumonline.com.

[32] BellSouth, *Common Questions*, http://www.fastaccess.com/content/consumer/common_questions.jsp.

[33] Transcript of Verizon Online DSL advertisement aired on Feb. 4, 2004 at 5:58 AM on WNBC in New York, NY. The Comcast ad was subsequently pulled off in the air, in response to copyright and other challenges made by Verizon.

[34] *MINTEL's Comperemedia: Telecom Companies Push Bundled Services Packages*, Business Wire (Mar. 9, 2004).

[35] *See, e.g.*, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability*, Third Report, 17 FCC Rcd 2844, ¶¶ 79-88 (2002); *Triennial Review Order* ¶ 263 ("[T]he Commission also has acknowledged the important broadband potential of other platforms and technologies, such as third generation wireless, satellite, and power lines.") (citing *Third Section 706 Report 2002*, 17 FCC Rcd 2844, ¶¶ 79-88 (2002)); R. Mark, *Broadband over Power Lines: FCC Plugs In*, Internetnews.com (Apr. 23, 2003), http://dc.internet.com/news/article.php/2195621 (Chairman Powell: "[t]he development of multiple broadband-capable platforms – be it power lines, Wi-Fi, satellite, laser or licensed wireless – will transform the competitive broadband landscape.").

account in the analysis of broadband competition,[36] particularly given that that the broadband market is still "in the earliest stages" and is evolving rapidly.[37]

Table 5. Typical Residential Offerings by Alternative Broadband Providers

Technology	**BPL**	**Satellite**		**Fixed Wireless**
Provider	**COMTek Broadband**	**DIRECWAY**	**StarBand**	**NTELOS Portable Broadband**
Downstream Bandwidth	300-500 kbps	500 kbps	250-500 kbps	1.5 Mbps
Upstream Bandwidth	300-500 kbps	50 kbps	up to 100 kbps	550 kbps
Monthly Price	$26.95	$59.99-$99.99	$39.99-$99.99	$34.95-$59.95
Availability	Manassas, VA	Continental U.S.	Nationwide	VA & NC Cities
Sources: See Appendix H.				

Table 6. Typical Small-Business Offerings by Alternative Broadband Providers

Technology	**BPL**	**Satellite**		**Fixed Wireless**
Provider	**COMTek Broadband**	**DIRECWAY**	**StarBand Small Office**	**NTELOS Portable Broadband**
Downstream Bandwidth	256 kbps-1.5 Mbps	1 Mbps	1 Mbps	1.5 Mbps
Upstream Bandwidth	256 kbps-1.5 Mbps	100 kbps	256 kbps	550 kbps
Monthly Price	$59.95-$359.70	$99.99-$129.99	$139.99-$159.99	$34.95-$59.95
Sources: See Appendix H.				

[36] The Commission has held that a proper market analysis must "examine not just the markets as they exist today," but must also take account of "future market conditions," including "technological and market changes, and the nature, complexity, and speed of change of, as well as trends within, the communications industry." *Applications of NYNEX Corp., Transferor, and Bell Atlantic Corp., Transferee, for Consent To Transfer Control of NYNEX Corp. and Its Subsidiaries*, Memorandum Opinion and Order, 12 FCC Rcd 19985, ¶¶ 3, 7, 41 (1997) ("*Bell Atlantic/NYNEX Merger Order*"); *Applications of Teleport Communications Group Inc., Transferor, and AT&T Corp., Transferee, For Consent To Transfer of Control of Corporations Holding Point-to-Point Microwave Licenses and Authorizations To Provide International Facilities-Based and Resold Communications Services*, Memorandum Opinion and Order, 13 FCC Rcd 15236, ¶ 19 n.65 (1998); *Applications for Consent to the Transfer of Control of Licenses from Comcast Corp., Transferor, and AT&T Corp. to AT&T Comcast Corp., Transferee*, Memorandum Opinion and Order, 17 FCC Rcd 23246, ¶ 27 (2002); *see also Triennial Review Order* ¶ 263 ("The fact that broadband service is actually available through another network platform and may potentially be available through additional platforms helps alleviate any concern that competition in the broadband market may be heavily dependent upon unbundled access."); *FCC v. RCA Communications, Inc.*, 346 U.S. 86, 96-97 (1953); *FCC v. WNCN Listeners Guild*, 450 U.S. 582, 594-95 (1981).

[37] *Bell Atlantic/NYNEX Merger Order* ¶¶ 40-41; *see also Inquiry Concerning the Deployment of Advanced Telecommunications Capability*, Third Report, 17 FCC Rcd 2844, ¶¶ 79-88 (2002) ("preconditions for monopoly appear absent" in the broadband market).

A. Fixed Wireless

Recent evidence confirms that fixed wireless continues to be a viable broadband alternative for many customers, and is likely to grow significantly in the future. The Commission has estimated that residential fixed wireless Internet access is available in counties that contain approximately 62 million people, or 22 percent of the U.S. population.[38] The national trade association for fixed wireless providers has stated that "approximately 1,500-1,800 [Wireless Internet Service Providers] already are providing service to approximately 600,000 subscribers in the U.S., with subscribership expected to double by the end of 2003 and reach nearly 2,000,000 by the end of 2004."[39] As the Chairman of that association has noted, "[w]ireless ISPs have rolled out broadband service in virtually every state of the union – and in hundreds of rural and metropolitan markets."[40]

There have been a number of new deployments of fixed wireless broadband service in 2004. In May 2004, NextNet announced the launch of non-line-of-sight broadband wireless service in conjunction with three regional ISP partners: W.A.T.C.H. TV in Ohio, SpeedNet in Michigan, and Gryphon Wireless in Nebraska.[41] Earlier this year, NextNet reported a successful trial with America Connect in Granville County, N.C.[42] In January 2004, NTELOS "announced initial commercial deployment of 'Portable Broadband,' high speed-Internet access to go" in Charlottesville, Stuarts Draft, and Waynesboro, Va. "for business and residential users."[43] A

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[38] *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Eighth Report, 18 FCC Rcd 14783, A-4 at n.709 (2003).

[39] Comments of the License-Exempt Alliance at 3, ET Docket No. 03-122 (FCC filed Sept. 3, 2003) ("*LEA Comments*") (citing Alvarion, Inc., *The License-Exempt Wireless Broadband Market* at 8 (Apr. 2003)). *See also* Comments of the PART-15 Organization at 8, ET Docket No. 02-381 (FCC filed Feb. 2, 2003) (estimating that there are approximately 8,000 WISPs nationwide, and that more than 1.5 million customers will be served by small WISPs' use of license-exempt spectrum). The Commission's own *High-Speed Services Report* counts only 367,118 high-speed lines provided through "satellite or fixed wireless" as of December 2003, but this is likely due to the fact that the many fixed wireless lines are provided in rural areas by small providers. As the Commission notes, "we do not know how comprehensively small providers, many of which serve rural areas with relatively small populations, are represented in the data summarized here." *June 2004 High-Speed Services Report* at 2.

[40] *WISPs Buck Investment Trends*, ISP-Planet (Nov. 12, 2002), http://www.isp-planet.com/research/2002/vc_trends_021112.html.

[41] NextNet Wireless News Release, *NextNet and Regional Service Providers Launch NLOS Broadband Wireless Services in Ohio, Michigan and Nebraska* (May 17, 2004). W.A.T.C.H. TV is an MMDS provider with over 10,000 customers in Ohio. SpeedNet holds MMDS licenses covering 500,000 households in northeast and mid-Michigan. Gryphon Wireless is an ITFS carrier "targeting 87,000 residential and SOHO subscribers in underserved markets" in Kearney, Neb. and the surrounding area. *Id.*

[42] NextNet Wireless News Release, *America Connect and NextNet Announce Successful Launch of Non-Line-of-Sight Broadband Wireless Trial at 2.3 GHz* (Jan. 21, 2004). The NextNet system has also been deployed by ISPs in Arizona, Iowa, Minnesota, and New Mexico. NextNet Wireless News Release, *NextNet and Regional Service Providers Launch NLOS Broadband Wireless Services in Ohio, Michigan and Nebraska* (May 17, 2004). NextNet was recently acquired by Clearwire, an organization backed by Craig McCaw. *See* Clearwire Press Release, *Wireless Pioneer Craig McCaw Launches Clearwire; Broadband Wireless Venture To Improve the Availability and Consumer Satisfaction of Residential Phone and Data Services* (June 2, 2004).

[43] NTELOS Press Release (Jan. 6, 2004), http://www.wcai.com/pdf/2004/mds_ntelosJan6.pdf. Portable Broadband will be available to approximately 50,000 households in these three cities. *Id.* NTELOS plans to expand the system later this year "to Lynchburg, VA, as well as fill out coverage in Charlottesville, and Waynesboro." *Id.*

growing number of cities are contemplating deployment of a fixed wireless network: The city of Philadelphia recently announced a plan to deploy wireless Internet access citywide; similar announcements were made in Madison, Wis., Boston, Mass., and St. Louis, Mo.[44] These cities would follow Culver City, Cal., Chaska, Minn., Corpus Christi, Tex., and Cleveland, Ohio, which already offer full or partial wireless coverage.[45]

A number of recent fixed wireless roll-outs and trials – including by NTELOS, W.A.T.C.H. TV, Gryphon Wireless, and America Connect – have been targeted at business customers as well as residential ones.[46] According to In-Stat/MDR, more small businesses are now using fixed wireless (22 percent of SOHO businesses and 23 percent of small businesses) than ADSL (18 percent and 23 percent, respectively).[47] In-Stat/MDR also expects 35 percent of small businesses and 39 percent of SOHO businesses to begin using fixed wireless within the next 12 months.[48]

As these deployments make clear, there has been a recent surge of investment in fixed wireless. Fixed wireless providers are now "attracting significant amounts of financing from venture capital private capital investments."[49] There has likewise been significant investment by

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The service offers "download speeds up to 1.5 Mbps, and upload speeds up to 550 Kbps" with prices starting at $49.95 per month. Consumers can use the service to receive high-speed connection both from their homes, but also from "anywhere within the coverage area" using the "added flexibility of un-tethered non-line-of-sight access" that is "truly plug-and-play, requiring no external antenna." *Id.*

[44] *See* D. Caruso, *Philly Considers Wireless Internet for All*, Associated Press (Sept. 1, 2004); L. Mills, *Madison Makes a Move Toward WiFi*. WMTV Madison. (Sept. 3, 2004); H. Allen, *Councilor Envisions Citywide Wireless Web Access*. Boston Globe (Sept. 2, 2004); D. Sheets, *Planners Considering City-Wide Wireless in St. Louis*, Post-Dispatch (Sept. 17, 2004).

[45] D. Caruso, *Philly Considers Wireless Internet for All*, Associated Press (Sept. 1, 2004); Culver City, *Culver City Wi-Fi Hotspot*, http://www.culvercitywifi.org/.

[46] *See, e.g.*, NTELOS Press Release (Jan. 6, 2004) (announcing "initial commercial deployment of 'Portable Broadband,' high speed-Internet access to go" "for business and residential users."); NextNet Wireless News Release, *NextNet and Regional Service Providers Launch NLOS Broadband Wireless Services in Ohio, Michigan and Nebraska* (May 17, 2004) (W.A.T.C.H. TV launched broadband wireless services "for business and residential subscribers in Lima, Ohio on May 1;" Gryphon Wireless offers "a broadband alternative to SOHO and residential subscribers."); NextNet Wireless News Release, *America Connect and NextNet Announce Successful Launch of Non-Line-of-Sight Broadband Wireless Trial at 2.3 GHz* (Jan. 21, 2004) (reporting the success of a fixed wireless trial in Granville County, N.C. NextNet and America Connect are working "toward the goal of creating new opportunities for business and residential populations in the Southeast.") (quoting NextNet president and CEO Guy Kelnhofer).

[47] *In-Stat/MDR December 2003 Study* at 19, Table 10.

[48] *Id*.

[49] *WISPs Buck Investment Trends*, ISP-Planet (Nov. 12, 2003), http://www.isp-planet.com/research/2002/vc_trends_021112.html; K. Beckman, *WorldCom MMDS Assets Go to BellSouth*, RCR Wireless News (May 19, 2003) ("Several fixed-wireless vendors have received investments during the past several months."); C. Nolter, *BellSouth Bids for WorldCom Unit*, Daily Deal (May 13, 2003) ("Since December, IPWireless, Aperto Networks and Soma Networks have received infusions from venture capital firms, [Yankee Group's Linda] Schroth wrote."); C.D. Marsan, *AirBand Attracts Venture Capital Largesse*, Network World ISP News Report Newsletter (Sept. 24, 2003) (AirBand, a WISP using fixed wireless technology to deliver broadband services in the Southwest, raised $10.5 million from a group of venture capital firms in the first half of 2003).

equipment suppliers.[50] For example, Intel and Nokia have begun aggressively promoting the technology.[51] Established telecom firms like Nextel also have recently invested in fixed wireless.[52] According to one recent estimate, the U.S. market for broadband wireless access services is expected to grow to $3.7 billion within five years.[53] Not surprisingly, the stocks of both fixed wireless providers and equipment suppliers have risen steadily over the past year.[54]

This renaissance in fixed wireless is due to the fact that its underlying technology and economics have improved considerably. One major development is the adoption of an industry-wide standard for fixed wireless broadband – IEEE 802.16a (commonly known as WiMax)– that is designed to provide "a wireless alternative to cable, DSL and T1/E1 for last mile broadband access," and that can "also be used as complimentary technology to connect 802.11 [*i.e.*, Wi-Fi]

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[50] *See, e.g.*, *Motorola Canopy(TM) Wireless Broadband Portfolio Expands with New 2.4GHz Product*, PR Newswire (Dec. 15, 2003); *Athena Semiconductors Closes Series B $10 Million Funding Round Led by Samsung*, Business Wire (Dec. 17, 2003); *Trango Broadband M900S 900MHz System Gains FCC Approval; Low Cost, Non-Line-of Sight Wireless Broadband Solution is Ready for Market*, Business Wire (Jan. 7, 2004); *Airspan Announces New Range of 802.16 OFDM Products*, Business Wire (Oct. 31, 2003).

[51] *See, e.g.*, *Intel, Nokia, Proxim, Others Launch WiMax*, TMCnet.com News (Apr. 11, 2003) ("Intel, Nokia, Proxim, and a host of other companies yesterday launched WiMax, a non-profit group formed to certify and promote the developing wireless broadband standard 802.16."); E. Moltzen, *Otellini: Dual-Core, WiMAX Now Key to Intel Strategy*, CRN (Sept. 7, 2004) (Intel's CEO recently announced the development of a new chip, Rosedale, that will be designed specifically "for 'customer premises equipment' that supports the new WiMAX connectivity standard."); R. Kay, *WiMax*, Computerworld (Dec. 1, 2003) ("Intel has now promised WiMax versions of its Centrino chip set for 2004, whereas Nokia says it will have battery and other technical issues solved in time to launch a WiMax cell phone in 2005."). *See also* R. Shim, *Cisco Joins WiMAX Forum*, CNETnews.com (Sept. 15, 2004), http://news.com.com/ Cisco+joins+WiMax+Forum/2100-1034_3-5368287.html?part=rss&tag=5368287&subj=news.1034.5.

[52] Nextel purchased MMDS spectrum from WorldCom and Nucentrix, and has already moved well into trials of WiMAX technology. Nextel cited two potential applications for WiMAX: as an enterprise solution for offering integrated Wi-Fi, cellular and WiMAX systems; and as a parallel data network, which would allow Nextel to reach remote areas. *See* C. Nolter, *Nextel Wins Nucentrix Spectrum*, Daily Deal (Nov. 7, 2003); G. Williams, *Nextel Communications Acquires Wireless Assets*, World Markets Analysis (Nov. 10, 2003); *Nextel May Be First Major WiMAX Operator*, Blueprint Wi-Fi (Nov. 26, 2003), http://www.rethinkresearch.biz/free_page_view.asp?crypt=%B3%9C%C2%97%8C%84%86%AF%BC%C2%88%97kvn%91; *see also* V. Lipset, *Operators Wary of WiMax, Study Says*, Wi-Fi Planet (Nov. 19, 2003), http://www.wi-fiplanet.com/news/article.php/3111361. Nextel is testing a wireless broadband service using the 802.20, "Mobile Fi" standard, across a coverage area of approximately 1,300 square miles in North Carolina's Research Triangle. Nextel News Release, *Nextel Expands Successful Broadband Trial To Include Paying Customers and Larger Coverage Area* (Apr. 14, 2004).

[53] Senza-Fili Consulting Press Release, *WiMAX Poised To Dominate US$3.7bn Market for Broadband Wireless Access* (Apr. 21, 2004) (citing a new study by BWCS and Senza-Fili Consulting). *See also* A. Cohen, *WiMAX: The Wireless Net Gets Extreme*, PC Magazine (July 13, 2004), http://www.pcmag.com/article2/0,1759,1611089,00.asp (The "broadband wireless market [is] expected to reach $1.2 billion by 2007, according to research firm In-Stat/MDR."); Comm. Daily, at 9 (Sept. 16, 2004) ("Research & Markets predicted WiMax equipment sales will reach $2.2 billion in 2009.") R. Kay, *WiMax*, Computerworld at 34 (Dec. 1, 2003) ("Visant Strategies Inc., a market research firm in Kings Park, N.Y., predicts that WiMax product sales will reach $1 billion by 2008. According to Oyster Bay, N.Y.-based ABI Research, the market for long-range wireless products based on 802.16 and the forthcoming 802.20 standard will reach $1.5 billion by 2008.").

[54] For example, the stock prices of fixed wireless equipment providers Alvarion (ALVR) and Endwave (ENWV) rose 574 percent and 1,356 percent, respectively, between January 2, 2003 and September 17, 2004. *See* Yahoo! Finance, *Historical Prices*, http://finance.yahoo.com (closing prices).

hot spots to the Internet."[55] The new standard enables fixed wireless to be used for high-speed data transmission over much greater distances than previous standards – "up to 30 miles, with a typical cell radius of 4-6 miles."[56] It also "allows users to get broadband connectivity without needing direct line of sight with the base station," a major limitation of previous generations of fixed-wireless technology.[57] The adoption of a common standard and the fact that the technology is maturing also have caused the costs of deploying fixed wireless to drop.[58] As one industry observer notes, "[f]irms like Winstar and Teligent 'used nonstandard gear,' . . . 'Once it becomes standardized, that brings down the cost.'"[59] The new standard also enables operators to

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[55] *See, e.g.*, *Merrill Lynch, Everything over IP* at 41. The 802.16a standard was approved by the IEEE and released January 29, 2003. *See* WiMAX Forum Press Release, *Group Expanded to Promote New Wireless Broadband Technology Standard* (Apr. 9, 2003). In June, the IEEE approved a revision to the 802.16 standard, creating "an agreed-upon technical base for these (WiMax products), which is essential, if you're going to have interoperability leading to mass market adoption and low-cost service." R. Shim, *WiMax in the Wings*, CNETnews.com (June 25, 2004) (quoting Craig Mathias, analyst, Farpoint Group). Initial vendor tests are scheduled for the third quarter of 2004, and certified equipment is expected in the market by the first half of 2005. *See* M. LaBrecque, WiMAX Forum President, *Enabling Deployments through Standards & Interoperability*, presentation before Wireless Communications Association Conference, at 10 (Jan. 20, 2004).

[56] *LEA Comments* at 4; D. Pescovitz, *10 Technologies To Watch in 2004*, CNN.com (Dec. 25, 2003), http://www.cnn.com/2003/TECH/ptech/12/23/bus2.feat.tech.towatch ("802.16: WiMax enables wireless networks to extend as far as 30 miles and transfer data, voice, and video at faster speeds than cable or DSL. It's perfect for ISPs that want to expand into sparsely populated areas, where the cost of bringing in DSL or cable wiring is too high.").

[57] WIMAX Forum, *WIMAX Overview* at 2, *available at* http://www.wimaxforum.org; *Strategy Analytics: Fixed Wireless Broadband Heads Home*, M2 Presswire (Nov. 19, 2003) ("'Advances in the underlying technology have relaxed the line-of-sight constraints that used to make residential installations an expensive and uncertain proposition,' says Tom Elliott, Vice President of Consulting with Strategy Analytics."); *see also id. (*A single base station "provides total data rates of up to 280 Mbps . . . which is enough bandwidth to simultaneously support hundreds of businesses with T1/E1-type connectivity and thousands of homes with DSL-type connectivity."); Intel Corp., White Paper, *IEEE 802.16 and WiMAX – Broadband Access for Everyone* at 3 (2003) ("a single 'sector' of an 802.16(a) base station . . . provides sufficient bandwidth to simultaneously support more than 60 businesses with T1 connectivity.").

[58] M. Angell, *Techs Again Tout Fixed Wireless*, Investor's Business Daily at A06 (May 7, 2003) ("'With a standard in place, that makes for a better selection of chips and should bring down the price of the technology,' said Margaret LaBrecque, president of the newly established WiMax Forum. LaBrecque also serves as marketing manager for Intel's broadband wireless group."); D. Molta, *[News Without the Noise] – 802.16a: Sedan or Mack Truck?* Network Computing (Aug. 7, 2003) ("As IEEE standardizes on a metropolitan wireless MAC interface and WiMax pushes the OFDM physical-layer interface, it's predictable that the cost of base-station equipment and subscriber modems will come down."); *Fixed Wireless as Residential Access Sees Renewed Life*, Electronic News (Nov. 24, 2003) ("Reduced equipment costs, improved performance, and an aggressive set of vendors and wireless ISPs are making fixed wireless a serious broadband contender in rural towns and urban fringes.") (quoting Tom Elliott, VP, Strategy Analytics).

[59] M. Angell, *Techs Again Tout Fixed Wireless*, Investor's Business Daily at A06 (May 7, 2003) (quoting Roger Marks, Chair, 802.16 Working Group); *see also WiMax Base Business Case Solid, But Big Opportunities Will Be Tougher, Vendors Say*, Comm. Daily at 5 (Sept. 13, 2004) ("The foundation for WiMax's success is open standards, [Mario] Pidutti [Redline Communications Product Management Director] said. This attracts multiple vendors to development, creating economies of scale that drive prices down and adoption up."); M. Hogan, *To the WiMAX: A New Protocol Spices Up the 802.X Alphabet Soup*, Entrepreneur (Dec. 1, 2003) ("WiMAX equipment could cost less than a quarter of current technology, with prices starting under $ 2,000.") (citing Intel marketing manager Margaret LaBrecque).

build scale more easily.[60] It is now estimated that these advances could make "last-mile WiMAX connections cheaper than cable and DSL solutions."[61] The sales of WiMax base stations is already a "$500 million a year business."[62]

B. Broadband over Power Lines

According to Chairman Powell, "Broadband over Power Line [BPL] has the potential to provide consumers with a ubiquitous third broadband pipe to the home."[63] Recent evidence confirms the near-term promise of this emerging broadband alternative. At least two commercial BPL rollouts are currently underway – one in Manassas, Va., the other in Cincinnati, Ohio.[64] Customer demand for service in Cincinnati has exceeded expectations, passing 15,000 homes with a 15 percent penetration rate, and 1,200 people are on a waiting list in Manassas.[65]

Almost two dozen additional BPL trials are underway across the United States,[66] including tests by some of the nation's largest utility providers.[67] It is estimated that "one-third

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[60] WIMAX Forum, *WIMAX Overview* at 3, *available at* http://www.wimaxforum.org ("Easy addition of new sectors supported with flexible channels maximizes cell capacity, allowing operators to scale the network as the customer base grows.").

[61] M. Hogan, *To the WiMAX: A New Protocol Spices Up the 802.X Alphabet Soup*, Entrepreneur (Dec. 1, 2003) (citing Intel marketing manager Margaret LaBrecque); *see also* J. Cook, *WiMax: The Next Generation for Better, Cheaper Net Access?*, Seattle Post-Intelligencer (Aug. 17, 2004) (David Willis, VP, Meta Group: "WiMax could reduce installation and maintenance costs by 41 percent when compared with the current wire-line costs of cable or DSL, he said.").

[62] *WiMax Base Business Case Solid, But Big Opportunities Will Be Tougher, Vendors Say*, Comm. Daily at 5 (Sept. 13, 2004) (citing Carlton O'Neal, Marketing VP, Alvarion).

[63] *Inquiry Regarding Carrier Current Systems, including Broadband over Power Line Systems*, Notice of Inquiry, 18 FCC Rcd 8498, Separate Statement of Chairman Michael K. Powell (2003); *see also Broadband*, National Journal's Technology Daily (Dec. 16, 2003).

[64] *See* COMTek, *Recent News*, http://www.comtekbroadband.com/ (COMTek acquired ZPLUG, the BPL operation in Manassas); *Cinergy and Current Communications To Offer Broadband Services over Power Lines*, Business Wire (Mar. 2, 2004) (announcing that companies "are beginning to offer broadband over power line (BPL) services in the greater Cincinnati, Ohio area"); D. Kumar, *Utilities Revise Broadband-over-Power-Line Rollout Schedules*, Comm. Daily (Dec. 9, 2003) ("Under current plans, Cinergy will pass 30,000-40,000 homes in Ohio in the first year and 250,000 in 3 years.").

[65] D. Kumar, *Post-Enron Trends Keeping Utilities from Venturing into* BPL, Comm. Daily at 2 (Sept. 14, 2004); J. Mears, *Broadband over Power Lines Gaining*, NetworkWorldFusion (Aug. 23, 2004), http://www.networkworldfusion.com/news/2004/082304specialfocus.html (quoting John Hewa, assistant director, electric utility, for the city of Manassas). *See also* J. Fallows, *Is Broadband Out of a Wall Socket the Next Big Thing?*, N.Y. Times (July 11, 2004) (Bill Grealis, Executive Vice President of Cinergy, says that the utility "had expected 10 percent of its eligible customers to sign up in the first year and another 10 percent in the second. In fact, 15 percent signed up in the first eight weeks, so Cinergy's main problem has been managing customer demand.").

[66] *See, e.g.*, *BPL Next Big Thing, Say Reports*, Electricity Daily (July 19, 2004) ("With almost two dozen utility trials underway and three commercial offerings already available, BPL is on track to become a major force in the high-speed Internet access market in the next decade."); B. Charny, *Internet Plugs Into PG&E Lines; Menlo Park Test to Send Broadband*, S.F. Chron. (July 15, 2004) ("There are about two dozen trials of the technology under way throughout the United States."); M. Kennedy, *Broadband Over Power Line Comes of Age: The Last Mile Solution May Have Been Under Our Noses the Whole Time*, Telecommunications Americas (July 1, 2004) ("At least 20 additional market or technical trials are also underway including a number at very large utilities.").

of electric utility companies are considering or already using BPL."[68] According to the United Power Line Council, some trials have stopped as most of the pilots move past the technical stage and into marketing trials.[69] The Power Line Communications Association estimates that "broadband over power line will reach between 750,000 and 1 million customers by the end of 2004."[70] Independent industry analysts estimate that "BPL will encompass six million power lines by 2006, promising revenues of $3.5 billion."[71]

The economics of deploying BPL are now reportedly relatively favorable, and technological hurdles have been overcome.[72] The core infrastructure – power lines that extend to virtually every home and business in the nation – is already in place. The cost of rolling out BPL over this existing infrastructure is expected to be less than $300 per home,[73] which is "substantially less than the cost of introducing cable modem or DSL service in new areas."[74]

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[67] M. Kennedy, *Broadband Over Power Line Comes of Age: The Last Mile Solution May Have Been Under Our Noses the Whole Time*, Telecommunications Americas (July 1, 2004) (Companies testing BPL include American Electric Power, Duke Power, PEPCO, Progress Energy, PG&E, and Southern Company.); B. Charny, *Internet Plugs Into PG&E Lines; Menlo Park Test to Send Broadband*, S.F. Chron. (July 15, 2004) ("AT&T Corp. and Pacific Gas and Electric Co. on Wednesday announced a trial run of broadband sent over power lines, an emerging alternative to cable and DSL for delivering high-speed Internet access."); Progress Energy News Release, *Progress Energy and Earthlink Testing Broadband Over Power Lines with Area Customers* (Feb. 18, 2004); D.T. Dang, *Utilities Test Potentially Revolutionary High-Speed Data Transmission System*, Baltimore Sun (May 11, 2003) ("such as Ohio's American Electric Power, New York's Consolidated Edison and Pennsylvania Power and Light"); *Amperion and IDACOMM Launch Broadband Over Powerline (BPL) Pilot in Boise, Idaho* (Jan. 6, 2004); Comments of Hawaiian Electric Company, Inc. at 1, ET Docket No. 03-104 (FCC filed July 2, 2003); *Muni in Upstate New York Views BPL Project As Plan with Little Risk, Plenty of Potential*, Electric Utility Week (Dec. 1, 2003).

[68] J. Breen, *et al.*, Thomas Weisel Partners, *Broadband over Power Lines: Finally . . . After All Those Years* at 2 (May 3, 2004).

[69] *Business and Regulatory Issues Slow Commercial BPL Rollouts*, Comm. Daily (Aug. 20, 2004).

[70] W. Rodgers, *Power To Interfere?*, Tampa Trib., MoneySense at 10 (Jan. 5, 2004). In February 2004, EarthLink invested $500,000 in BPL provider Ambient; EarthLink had teamed with Ambient in its BPL pilot with Con Edison. *See* Comm. Daily (Feb. 23, 2004).

[71] *At CompTel Fall 2003: What's The Next Big Thing*, Comm. Today (Oct. 13, 2003) (citing Gartner Group research).

[72] *See* T. Wolzien, *et al*., Bernstein Research Call, *Weekend Media Blast #32: Fiber Comes to River Road* (Aug. 6, 2004) ("BPL is a transformational technology that now works.").

[73] *See* B. Alpert, *Cable, Telcos Face Internet Shocker: New Medium: Power Lines*, Barron's (Aug. 9, 2004); *see also* J. Dizard, *Time To Bid Goodbye To Fat Cable Margins*, Financial Times (July 26, 2004) ("David Shpigler, whose Shpigler Group is a BPL partner with several utilities, says: 'The cost of BPL per home passed in suburban areas is about Dollars 100-Dollars 150. Then the customer premises equipment is another Dollars 100-Dollars 200.'").

[74] C. Berg, *PPL Tests Broadband Internet Service*, Morning Call at A1 (Apr. 27, 2003); *see also* P. Davidson, *High-speed Net Coming to a Plug Near You?*, USA Today (Apr. 14, 2003) ("Costs recently have fallen to $50 to $160 per home passed, suppliers say. 'The breakthrough is that cheaper silicon has made this possible on a large scale,' says Amperion CEO Philip Hunt. This is much cheaper than what cable and phone giants had to spend beefing up their networks with fiber or copper, as well as adding broadband gear. At first, they spent $750 to $1,000 per home passed, though costs lately have fallen to $200 to $400, Jupiter's Joe Laszlo says.").

Installation is inexpensive and quick.[75] And, "[i]n most cases, there is no need to send a truck or utility worker to each home to set up equipment. A consumer needs only to plug in a $70 power line modem, typically used for home networking."[76]

Technological hurdles "also have now been economically cleared."[77] For example, transmitting a signal through power transformers, "one of the biggest obstacles to making power line communications work,"[78] can now be circumvented by no fewer than three different methods.[79] While ham radio operators have complained about interference from BPL,[80] both the Commission and state regulatory officials have expressed confidence that the problems are "solvable."[81] In the commercial BPL systems up and running, "ham radio operators have made no interference complaints."[82]

BPL can be used to provide high-speed access at speeds comparable to or faster than DSL and cable, and at comparable prices.[83] Current Technologies, Cinergy's BPL partner,

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[75] Infrastructure can be installed at a rate of 20-35 homes per hour. *See* J. Dizard, *Time To Bid Goodbye To Fat Cable Margins*, Financial Times (July 26, 2004). "A utility worker can connect a piece of communications equipment to a medium-voltage line in about 10 minutes." *Tampa, Fla.-Area Electric Utility May Offer New Outlet for Broadband*, Tampa Trib. (Oct. 6, 2003); *id.* ("BPL is cheap to install.").

[76] D.T. Dang, *Utilities Test Potentially Revolutionary High-Speed Data Transmission System*, Baltimore Sun (May 11, 2003).

[77] Comments of Current Technologies, LLC. at 4, ET Docket No. 03-104 (FCC filed July 7, 2003); *see also* J. Mears, *Broadband over Power Lines Closer to Reality*, Network World (June 2, 2003) ("Today, companies . . . have developed technology to move bits across medium- and low-voltage lines.").

[78] C. Berg, *PPL Tests Broadband Internet Service*, Morning Call at A1 (Apr. 27, 2003); *see also* P. Davidson, *High-speed Net Coming to a Plug Near You?*, USA Today (Apr. 14, 2003) ("The biggest roadblock, however, is the transformer that converts medium-voltage current (10,000 to 69,000 volts) to the low voltages (220/110) that enter your home. It can swallow data signals whole.").

[79] *See* P. Davidson, *High-speed Net Coming to a Plug Near You?*, USA Today (Apr. 14, 2003) ("Ambient and Current Technologies bypass the transformer with a special wire that carries the data, while only electric current passes through the transformer. Main.Net relies on packet-chopping technology to slip the data intact through the trash-can-sized transformer. And Amperion's Wi-Fi antennas wirelessly link the Internet signal to the customer before it gets to the transformer."); *see also* C. Berg, *PPL Tests Broadband Internet Service*, Morning Call at A1 (Apr. 27, 2003).

[80] *See, e.g.*, D. Lazarus, *Ham Radio Operators Squawk Over BPL*, S.F. Chron. (July 18, 2004).

[81] *See, e.g.*, FCC News Release, *FCC Chairman Powell: The Future Is Bright for Powerline Broadband* (July 14, 2004) ("The future is bright for powerline broadband. We'll continue at the FCC to explore ways to support this technology while protecting other services from interference."); D. Jackson, *Powell Hopeful About BPL Potential*, Telephony (July 15, 2004) (California state commissioner Susan Kennedy: "Every problem we talked about is solvable.").

[82] D. Kumar, *Post-Enron Trends Keeping Utilities from Venturing into BPL*, Comm. Daily at 2-4 (Sept. 14, 2004) (citing Greg Wolf, vp of Cinergy Ventures, and John Hewa, assistant directory – electric utilities, city of Manassas).

[83] *See* D. Kumar, *Utilities Revise Broadband-over-Power-Line Rollout Schedules*, Comm. Daily (Dec. 9, 2003) ("symmetrical speeds of 1.5 Mbps to 2 Mbps"); C. Berg, *PPL Tests Broadband Internet Service*, Morning Call at A1 (Apr. 27, 2003) ("[Main.net President Joe] Marsilii said Main.net's system can achieve speeds up to 1.8 megabits per second – faster than DSL and about as fast as the best cable modems. And, he said, the next generation of technology will be five times faster than that.").

reports service speeds "in excess of 3 mbps."[84] Companies plan to sell BPL service at rates comparable to or less than those of other access services.[85] COMTek's BPL service in Manassas is offered at $28.95 per month for residential users, and starting at $59 per month for business users.[86] Progress Energy offers its BPL customers service for $19.95 per month for the first three months, and $39.95 per month thereafter.[87] For homes with BPL available, the powerline service presents a competitive option: of Cinergy's approximately 1,400 paying data customers in Cincinnati, 40 percent abandoned DSL, 40 percent abandoned Time Warner Cable, and 20 percent are new to broadband.[88]

C. Satellite

Satellite is another broadband alternative that has begun a resurgence. As one industry observer has noted, "satellite broadband will be on the upswing again in 2004."[89]

One of the two main broadband satellite providers – Hughes Network Systems – reported 180,000 customers for its DIRECWAY service as of year-end 2003.[90] In October 2003, MCI began reselling Hughes's DIRECWAY service to "small-to-medium businesses and enterprises."[91] MCI notes that "with today's broadband satellite technology . . . you can connect remote employees and offices wirelessly while experiencing the same advantages that many terrestrial options offers, such as speed, security and reasonable costs."[92]

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[84] Cinergy News Release, *Cinergy, Current Communications Begin Marketing BPL to Municipal Utilities, Rural Electric Cooperatives* (Aug. 9, 2004).

[85] *See, e.g.*, *Muni in Upstate New York Views BPL Project as Plan with Little Risk, Plenty of Potential*, Electric Utility Week (Dec. 1, 2003) ("[DVI] plans to offer basic Internet service to residents for $29.95/month, with business customers paying $89.95/month at speeds that are comparable to digital subscriber line and cable Internet service"); S. Strangmeier, *Consumers to Surf Power Lines*, Natural Gas Week (Dec. 5, 2003) ("BPL proponents claim it costs less than major cable and telephone services at about $29.95/month."); C. Berg, *PPL Tests Broadband Internet Service*, Morning Call at A1 (Apr. 27, 2003) ("[P]ower line communications will be significantly cheaper than its competitors."); A. Szoke, *Electric Utilities Try to Plug in to High-Speed Internet in Peoria, Ill., Area*, Journal Star (Apr. 22, 2003) ("Some utilities have said they may be able to offer [BPL] at a cost of $30 to $40 a month for residential users compared to the $40 to $50 average monthly charge for broadband.").

[86] COMTek, *Broadband Services*, http://www.comtekbroadband.com/.

[87] Progress Energy News Release, *Progress Energy and Earthlink Testing Broadband Over Power Lines With Area Customers* (Feb. 18, 2004).

[88] *See* T. Wolzien, *et al.*, Bernstein Research Call, *Weekend Media Blast #32: Fiber Comes to River Road* (Aug. 6, 2004).

[89] R. Brown, *et al.*, *Smooth Sailing or the Perfect Storm?*, CED (Jan. 1, 2004); *see also ISCE Panelists See Big Satellite Broadband Growth*, Satellite Week (Aug. 25, 2003) ("Michael Agnostelli, SES Americom vp-business strategy, said that for the first time DBS TV services cost less…than cable TV. 'There's no reason satellite broadband can't cost less than [DSL or cable modem],' he said: 'The technology is well positioned to hit the cost point and performance point that consumers are looking for.'").

[90] DirecTV Group Inc., Form 10-K (SEC filed Mar. 17, 2004) (residential and small office/home-office customers in North America).

[91] MCI, *Enterprise, Internet Broadband Satellite*, http://global.mci.com/us/enterprise/internet/broadbandsat/.

[92] *Id.*

The other main satellite provider – StarBand – emerged from bankruptcy in November 2003 with most of its customer base intact.[93] The company has introduced new hardware and service offerings targeted at mass-market customers that offer lower prices and higher speeds than were previously available.[94] StarBand's residential service begins at $50 a month. *See* Table 5.

Finally, WildBlue Communications plans to introduce broadband satellite service in the Ka-band in early 2005.[95] The National Rural Telecommunications Cooperative (NRTC) has agreed to a distribution partnership with WildBlue, and members of NRTC will offer WildBlue's service across the country.[96] According to NRTC President and COO Bob Phillips, "[NRTC is] confident that WildBlue is the best solution to deliver affordable high-speed satellite Internet access to rural America," and that "virtually every home and small business in the continental United States will finally have access to the most advanced telecommunications services available."[97] WildBlue "expects to beat its predecessor [satellite companies] on both speed and price."[98]

D. 3G Mobile Wireless

Third-generation (3G) wireless services are becoming another competitive alternative for broadband. These new 3G networks rely on IP in place of traditional communications protocols used on wireless networks,[99] enabling providers to offer advanced wireless features. These new wireless networks also are expected to greatly increase the use of wireless networks for data transmission,[100] and to compete directly with fixed broadband services such as cable modem and DSL in the provision of high-speed Internet access.[101]

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[93] *Starband To Emerge from Bankruptcy Protection by Month's End*, Satellite Week (Nov. 24, 2003) ("Starband is expected to emerge from bankruptcy protection late this month with a revamped sales staff. . . . Starband has 38,000 subscribers, having lost 2,000 since filing for bankruptcy protection in U.S. Dist. Court, Wilmington, Del., in May 2002.").

[94] *See, e.g.*, StarBand Press Release, *StarBand Launches New 481 Residential Service* (July 15, 2004) (StarBand's 481 Residential service "provides . . . the satellite industry leading upload speeds at an affordable monthly fee ranging from $69.99 to $89.99 per month based on term commitment length"); StarBand Press Release, *The Satellite Internet Industry's Fastest SOHO Upload Speed – Up to 256 Kbps* (Aug. 19, 2004) (StarBand's new 484 Small Office service provides download speeds of up to 1 Mbps, with upload speeds up to 256 kbps)

[95] WildBlue Pres Release, *WildBlue Lines Up Key Provisioning, Back Office and Integration* Support (July 28, 2004). WildBlue launched its Telesat Anik F2 satellite in July 2004. A second satellite will be ready for launch "as the market demands." *$50 Broadband Beams from the WildBlue Yonder*, Broadband Business Forecast (Aug. 10, 2004).

[96] WildBlue Communications Press Release, *NRTC to Offer WildBlue Satellite Broadband Services* (Aug. 25, 2003).

[97] *Id.*

[98] R. Poe, *WildBlue's Satellite Launch*, America's Network (July 26, 2004).

[99] *See, e.g.*, *Internet Protocol Phone: Communication is a Necessity*, BusinessWorld (Jan. 27, 2004) ("IP is the basis of the internet, and the standard that will eventually be used for most wireless 3G (third generation) network infrastructure.").

[100] *See, e.g.*, 10 Downing Street Press Release, *Strategy To Deliver Best Outcomes for Consumers from the Competition in Electronic Networks* (Dec. 2, 2002) ("New wireless networks, including 3G, are expected to

Verizon Wireless launched a 3G wireless network in Washington, DC and San Diego in October 2003,[102] in Las Vegas in July 2004,[103] and in 11 additional markets including New York, Philadelphia, and Los Angeles in September 2004.[104] Verizon's 3G service using EvDO technology provides Internet access at speeds of 300-500 kbps, with bursts up to 2 Mbps.[105] As one analyst notes, the download speeds of EvDO networks are "comparable to those of DSL and cable modems."[106] Verizon announced that it will spend over $1 billion deploying its EvDO network over the next two years, and with 34 million Americans able to access EvDO as of September, the company is "on target" to expand its EvDO offering to cover one third of its network – approximately 75 million Americans – by the end of 2004.[107] This puts pressure on other wireless providers to follow suit.

In July 2004, AT&T Wireless launched a 3G wireless network using Universal Mobile Telecommunications System (UMTS) technology in Detroit, Phoenix, San Francisco, and Seattle,[108] and in September 2004 expanded service to Dallas and San Diego.[109] The service provides customers with average wireless data speeds between 220 and 320 kbps, with bursts of up to 384 kbps.[110] The UMTS service can be "easily and cost-effectively upgraded" by AT&T

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complement wired networks for data transmission, but not to replace them."); *At Last, 3G Rollouts Show More Boom Than Bust*, Wireless Data News (Dec. 17, 2003) ("'The next generation of CDMA architecture will be driven by person-to-person communications,' said Adam Gould, CTO of CDMA for Nokia Mobile Phones. 'We'll see an evolution of voice services first, then higher-quality packet switching and then music. Data will go from downloads to more person-to-person without a fixed, PC-like IP address.'").

[101] *Merrill Lynch, Everything over IP* at 36 ("Pressure [from IP wireless] is likely to be felt in two directions, with fixed broadband and VoIP services (such as WiFi) cutting into the mobile opportunity, and mobile broadband services potentially taking some of the [High-Speed Data] market opportunity.").

[102] Verizon Wireless Press Release, *Wireless Broadband Data Service Introduced in Major Metro Areas* (Sept. 29, 2003).

[103] Verizon Wireless Press Release, *Verizon Wireless Announces Roll Out of 3G Network in Las Vegas* (July 27, 2004).

[104] Verizon Wireless Press Release, *Verizon Wireless Expands BroadbandAccess 3G Network To Cover 14 Markets from Coast to Coast* (Sept. 22, 2004) (announcing the launch of EvDO service in Atlanta, Austin, Baltimore, Kansas City, Los Angeles, Miami/Fort Lauderdale, Milwaukee, New York, Philadelphia, Tampa, and West Palm Beach).

[105] Verizon Wireless Press Release, *Verizon Wireless Announces Roll Out of National 3G Network* (Jan. 8, 2004).

[106] B. Richards, *et al.*, CIBC World Markets, Investext Rpt. No. 7305232, Sierra Wireless Inc. – Company Report at *2 (Mar. 6, 2003).

[107] Verizon Wireless Press Release, *Verizon Wireless Expands BroadbandAccess 3G Network To Cover 14 Markets from Coast to Coast* (Sept. 22, 2004).

[108] AT&T Wireless Press Release, *AT&T Wireless Delivers 3G UMTS Service in the United States* (July 20, 2004).

[109] AT&T Wireless Press Release, *AT&T Wireless Extends 3G UMTS Service to Dallas and San Diego* (Sept. 1, 2004).

[110] AT&T Wireless Press Release, *AT&T Wireless Delivers 3G UMTS Service in the United States* (July 20, 2004).

Wireless to provide service of up to 14.4 Mbps.[111] Cingular Wireless will conduct UMTS trials in Atlanta this summer and could begin deployment in 2005.[112]

Sprint has begun conducting trials of EvDO; it will deploy EvDO in select markets in the second half of 2004, and launch in the majority of top metropolitan markets in 2005.[113] Nextel has expanded its trials of Flarion's next-generation wireless platform, which provides bandwidth of between 1-3 Mbps.[114] Nextel has stated that it could build a wireless broadband network for $2.5 to $3.0 billion.[115]

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[111] *Id*.

[112] *Id*.

[113] Sprint Press Release, *Sprint Announces Plans to Extend Its Wireless Data Leadership with Launch of High-Speed Wireless Data Technology* (June 22, 2004).

[114] Nextel Press Release, *Nextel Expands Successful Broadband Trial to Include Paying Customers and Larger Coverage Area* (Apr. 14, 2004).

[115] J. Breen, Jr., *et al.*, Thomas Weisel, *NXTL: What's Next? $30 More Likely Than $20* at 7 (Aug. 13, 2004).

APPENDIX B. PRICE COMPARISONS

Table 1. New York-Northern New Jersey-Long Island, NY-NJ-PA MSA

	Circuit-Switched				VoIP[1]							Wireless[2]	
	Verizon Freedom	**RCN Megaphone**	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Cablevision Optimum Voice**	**Time Warner Cable Digital Phone**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$60	$60	$55	$50	$35[4]	$40[5]	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$15+	$15+	$15+	$14+	none	$8	$2-$4	$3-$4	$1-$2	$1	none	$6-$11	$5-$9
Local	Unlimited				Unlimited							600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited								
Long Distance	Unlimited				Unlimited								
International	Unlimited to Canada				Unlimited to Canada		Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Voicemail	✓	✓	+$5	✓	✓	+$4	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

[4] Cablevision also offers this package bundled with high-speed Internet and digital cable service for $89.85 a month. Customers 'are essentially receiving their voice service for free,' according to Cablevision.

[5] Price reflects the $10 discount for customers subscribing to both digital cable and high-speed Internet services.

Table 2. Los Angeles-Long Beach-Santa Ana, CA MSA

	Circuit-Switched				VoIP[1]						Wireless[2]	
	SBC All Distance Connections	**Comcast Connections Any Distance**	**RCN Megaphone**	**MCI Neighbor-hood Complete**	**Time Warner Cable Digital Phone**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$49	$49	$50	$40	$40[4]	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$12+	$12+	$12+	$11+	$7	$2	$4	$1	$1	none	$9	$7
Local	Unlimited				Unlimited						600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited							
Long Distance	Unlimited				Unlimited							
International						Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding			✓			✓	✓	✓	✓	✓	✓	✓
Voicemail	✓		✓	✓	+$4	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.
[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.
[3] Taxes, fees, and surcharges are approximate.
[4] Price reflects the $10 discount for customers subscribing to both digital cable and high-speed Internet services.

Table 3. Chicago-Naperville-Joliet, IL-IN-WI MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	SBC All Distance Connections	**Comcast Connections Any Distance**	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$49	$49	$49	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$12+	$12+	$12+	$12+	$2	$3-$4	$1	$1	none	$11	$8
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International					Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding			✓		✓	✓	✓	✓	✓	✓	✓
Voicemail	✓		+$5	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

Table 4. Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	Verizon Freedom	**RCN Megaphone**	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$55	$55	$50	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$13+	$13+	$13+	$13+	$2	$1-$3	$1-$2	$1	none	$6-$10	$5-$8
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International	Unlimited to Canada				Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Voicemail	✓	✓	+$5	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

Table 5. Dallas-Fort Worth-Arlington, TX MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	SBC All Distance Connections	**Comcast Connections Any Distance**	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$49	$50	$49	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$12+	$13+	$12+	$13+	$2	$3	$1	$1	none	$10	$8
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International					Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding			✓		✓	✓	✓	✓	✓	✓	✓
Voicemail	✓		+$5	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

Table 6. Miami-Fort Lauderdale-Miami Beach, FL MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	BellSouth Value Answers Premier	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Z-Tel Z-Line HOME Unlimited**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$55	$55	$50	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$14+	$14+	$13+	$13+	$2	$3	$1	$1	none	$11	$9
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International					Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Voicemail	+$4	+$5	✓	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

Table 7. Washington-Arlington-Alexandria, DC-VA-MD-WV MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	Verizon Freedom	**Starpower Ultra Unlimited Long Distance**	**Cox Unlimited Connections (Fairfax)**	**MCI Neighbor-hood Complete**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$50	$52	$49	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$10+	$10+	$10+	$10+	$2	$2-$3	$1	$1	none	$6-$9	$5-$7
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International	Unlimited to Canada				Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Voicemail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

Table 8. Houston-Baytown-Sugar Land, TX MSA

	Circuit-Switched			VoIP[1]						Wireless[2]	
	SBC All Distance Connections	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Time Warner Cable Digital Phone**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**BroadVoice Unlimited USA**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$49	$49	$50	$40[4]	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$12+	$12+	$13+	$12	$2	$3	$1	$1	$2	$10	$8
Local	Unlimited			Unlimited						600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited			Unlimited							
Long Distance	Unlimited			Unlimited							
International					Unlimited to Canada						
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding		✓		✓	✓	✓	✓	✓	✓	✓	✓
Voicemail	✓	+$5	✓	+$4	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

[4] Price reflects the $10 discount for customers subscribing to both digital cable and high-speed Internet services.

Table 9. Atlanta-Sandy Springs-Marietta, GA MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	BellSouth Value Answers Premier	**Comcast Connections Any Distance**	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$55	$50	$50	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$14+	$13+	$13+	$13+	$2	$3	$1	$1	none	$7	$5
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International					Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding	✓		✓		✓	✓	✓	✓	✓	✓	✓
Voicemail	+$4		+$5	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

Table 10. Detroit-Warren-Livonia, MI MSA

	Circuit-Switched				VoIP[1]					Wireless[2]	
	SBC All Distance Connections	**Comcast Connections Any Distance**	**AT&T One Rate USA**	**MCI Neighbor-hood Complete**	**Vonage Premium Unlimited**	**AT&T Call Vantage**	**VoicePulse America Unlimited**	**Packet8 Freedom Unlimited**	**Lingo Unlimited**	**Cingular Nation GSM 600**	**T-Mobile Get More (National)**
Price per Month	$49	$49	$49	$50	$25	$30	$35	$20	$20	$50	$40
Taxes, Fees & Surcharges[3]	$11+	$11+	$11+	$11+	$2	$3	$1	$1	none	$6	$5
Local	Unlimited				Unlimited					600 A, unltd. N/W, unltd. M-M mins; rollover	600 A, unltd. N/W minutes
Local Toll	Unlimited				Unlimited						
Long Distance	Unlimited				Unlimited						
International					Unlimited to Canada				& Western Europe		
Call Waiting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Caller ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Call Forwarding			✓		✓	✓	✓	✓	✓	✓	✓
Voicemail	✓		+$5	✓	✓	✓	✓	✓	✓	✓	✓

[1] Requires broadband connection at additional cost.

[2] Abbreviations used for wireless plans: A – Anytime; N/W – Night/Weekend; M-M – Mobile-to-Mobile; unltd. – unlimited; rollover – unused minutes are carried over to the next billing cycle.

[3] Taxes, fees, and surcharges are approximate.

APPENDIX C. ADDITIONAL VOIP SERVICES

Plan	Service Price	Local/Local Toll/ Long Distance	Required Equipment*
American Int'l Telephonics	prepaid minutes	4.9¢/min. to PSTN	free software
BuddyTalk	free	unlimited to BuddyTalk users; 4¢/min. (prepaid) to PSTN	free software
Crystal Voice LIVE	$19.99/yr. (renew for $14.95/yr.)	unlimited to LIVE users; 2.9¢/min.to PSTN	free software
Dialpad Monthly 300	$7.50	300 min.	free software
Dialpad Monthly 500	$9.99	500 min.	free software
Dialpad Monthly 1200	$19.99	1200 min.	free software
Free IP Call	free	unlimited to Free IP users	SIP telephone or SIP software
Free World Dialup	free	unlimited to FWD & partner members	IP phone or free FWD software
iConnectHere Per Minute	none	2.9¢/min.+	free software
iConnectHere N. America 400	$5.95	400 min.	free software
iConnectHere N. America 1000	$10.95	1000 min.	free software
ICQPhone	free	unlimited to ICQPhone users; 2¢/min. (prepaid) to PSTN	free software
InPhonex Basic Membership	free	unlimited to InPhonex members	free software
InPhonex Premium Membership	$19.95/yr.	300 min. to PSTN + choice of prepaid long-distance options: 125-1250 min. for $4.95-$39.95	free software
MeritCall FreedomFone	activation fee: $19.99 (currently waived)	unlimited to MeritPhone users; 1.9¢/min. to PSTN	FreedomFone
Net2Phone VoiceLine Basic	$8.99	unlimited inbound; 2.9¢/min. outbound	Innomedia MTA3328-2 Telephone Adapter
Net2Phone VoiceLine	$9.99	unlimited to VoiceLine users; unlimited inbound/300 min. outbound to PSTN	Innomedia MTA3328-2 Telephone Adapter
	$14.99	unlimited to VoiceLine users; unlimited inbound/500 min. outbound to PSTN	
Primus Talk	prepaid minutes	3.9¢/min.	free software
SIP Phone	free	unlimited to anyone with a SIPphone or SIPadapter	SIPphone or SIPadapter
SIP Phone Virtual Number	$3.99/mo. (6 mo.) or $2.99/mo. (1 yr.)	3¢/min.	SIPphone or SIPadapter
Skype	free	unlimited to Skype users	free software
SnapTel	prepaid minutes	2.9¢/min.	free software
TechTerra TerraCall	free	unlimited SIP-to-SIP; 1.94¢/min. (prepaid) to PSTN	free software

*In addition to PC sound card and handset or headset.
Sources: See Appendix H.

APPENDIX D. CLEC NETWORKS BY MSA

This attachment tabulates the number of CLEC networks in the 150 largest Metropolitan Statistical Areas (MSAs). The data are from New Paradigm Resources Group's *CLEC Report* 2004, which describes CLEC networks as either "Operational," "On-Net," "Resale," or "Planned." We have tabulated only Operational and On-Net networks, both of which appear to involve the use of a CLEC's own facilities. CLECs operating On-Net networks are indicated in italics.

In some MSAs, the total number of Operational and On-Net networks exceeds the number of CLECs operating within those MSAs. This is due to the fact that, in some instances, individual CLECs operate multiple networks within the same MSA.

MSA	CLEC Networks – 2004
1. New York-Northern New Jersey-Long Island, NY-NJ-PA	Allegiance Telecom; AT&T; Broadview Networks; *Cablevision Lightpath*; *Comcast Business Communications*; *Conversent Communications*; Eagle Communications; *Focal Communications*; Global Crossing; IDT/Winstar Communications; MCI; *PaeTec*; Qwest Communications; *RCN*; *SBC Telecom*; Time Warner Telecom; *XO* **CLECs: 17** **Operational Networks: 56** **On-Net Networks: 27**
2. Los Angeles-Long Beach-Santa Ana, CA	Allegiance Telecom; AT&T; Cox Communications; Eagle Communications; *Focal Communications*; Global Crossing; *ICG Communications*; IDT/Winstar Communications; MCI; *Mpower Communications*; *Pac-West Telecomm*; *PaeTec*; Qwest Communications; *RCN*; Time Warner Telecom; US Telepacific; *XO* **CLECs: 17** **Operational Networks: 34** **On-Net Networks: 24**
3. Chicago-Naperville-Joliet, IL-IN-WI	Allegiance Telecom; AT&T; CoreComm; *Eagle Communications*; Focal Communications; Global Crossing; Globalcom; ICG Communications; IDT/Winstar Communications; MCI; *McLeodUSA*; Mpower Communications; PaeTec; Qwest Communications; *RCN*; Time Warner Telecom; Verizon; XO **CLECs: 18** **Operational Networks: 23** **On-Net Networks: 6**
4. Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	Allegiance Telecom; AT&T; Broadview Networks; Cablevision Lightpath; *Cavalier Telephone*; *Comcast Business Communications*; *CoreComm*; CTC Communications; Eagle Communications; *Focal Communications*; Global Crossing; IDT/Winstar Communications; MCI; *PaeTec*; Qwest Communications; *RCN*; SBC; US LEC; *XO* **CLECs: 19** **Operational Networks: 26** **On-Net Networks: 34**
5. Dallas-Fort Worth-Arlington, TX	Allegiance Telecom; AT&T; *Birch Telecom*; *Eagle Communications*; *Focal Communications*; Global Crossing; Grande Communications Network; ICG Communications; IDT/Winstar Communications; *ITC^DeltaCom*; Logix Communications; MCI; *Mpower Communications*; Qwest Communications; Time Warner Telecom; XO **CLECs: 16** **Operational Networks: 25** **On-Net Networks: 8**
6. Miami-Fort Lauderdale-Miami Beach, FL	Allegiance Telecom; AT&T; *Florida Digital Network*; *Eagle Communications*; *ITC^DeltaCom*; MCI; *Mpower Communications*; *US LEC*; NuVox Communications; *PaeTec*; SBC Telecom; XO **CLECs: 14** **Operational Networks: 24** **On-Net Networks: 12**
7. Washington-Arlington-Alexandria, DC-MD-VA-WV	Allegiance Telecom; *AT&T*; *Cavalier Telephone*; *Comcast Business Communications*; Cox Communications; *Focal Communications*; Global Crossing; ICG Communications; IDT/Winstar Communications; MCI; *PaeTec*; Qwest Communications; *RCN*; SBC Telecom; *US LEC*; XO **CLECs: 16** **Operational Networks: 18** **On-Net Networks: 29**
8. Houston-Baytown-Sugar Land, TX	Allegiance Telecom; AT&T; *Birch Telecom*; *Eagle Communications*; Focal Communications; Global Crossing; Grande Communications Network; ICG Communications; IDT/Winstar Communications; ITC^DeltaCom; Logix Communications; MCI; McLeodUSA; *Mpower Communications;* Qwest Communications; Time Warner Telecom; XO **CLECs: 17** **Operational Networks: 19** **On-Net Networks: 4**
9. Detroit-Warren-Livonia, MI	AT&T; Comcast Business Communications, IDT/Winstar Communications; MCI; *Mpower Communications*; Qwest Communications; XO **CLECs: 7** **Operational Networks: 14** **On-Net Networks: 1**

MSA	CLEC Networks – 2004
10. Boston-Cambridge-Quincy, MA-NH	Allegiance Telecom; AT&T; *BayRing Communications*; Broadview Networks; Choice One Communications; Conversent Communications; *CTC Communications*; Eagle *Communications*; Focal Communications; Global Crossing; Global NAPs; ICG Communications; IDT/Winstar Communications; MCI; PaeTec; Qwest Communications; *RCN*; *RNK Telecom*; SBC Telecom; XO **CLECs: 20** **Operational Networks: 22** **On-Net Networks: 43**
11. Atlanta-Sandy Springs-Marietta, GA	Allegiance Telecom; AT&T; *Birch Telecom*; Cox Communications; Eagle Communications; Global Crossing; Grande Communications Network; ICG Communications; IDT/Winstar Communications; *ITC^DeltaCom*; MCI; Mpower Communications; *NewSouth Communications*; NuVox Communications; *SBC Telecom*; Time Warner Telecom; US LEC; Verizon; *XO* **CLECs: 19** **Operational Networks: 21** **On-Net Networks: 9**
12. San Francisco-Oakland-Fremont, CA	Allegiance Telecom; AT&T; *Focal Communications*; Global Crossing; *ICG Communications*; IDT/Winstar Communications; MCI; *Mpower Communications*; *Pac-West Telecomm*; Qwest Communications; *RCN*; Time Warner Telecom; *US Telepacific*; *XO* **CLECs: 14** **Operational Networks: 21** **On-Net Networks: 13**
13. Riverside-San Bernardino-Ontario, CA	Allegiance Telecom; *AT&T*; *ICG Communications*; *Mpower*; *Pac-West Telecomm*; *Time Warner Telecom* **CLECs: 6** **Operational Networks: 4** **On-Net Networks: 8**
14. Phoenix-Mesa-Scottsdale, AZ	Allegiance Telecom; AT&T; Cox Communications; Eschelon Telecom; Global Crossing; IDT/Winstar Communications; MCI; *McLeodUSA*; Pac-West Telecomm; SBC Telecom; Time Warner Telecom; Verizon; XO **CLECs: 13** **Operational Networks: 13** **On-Net Networks: 2**
15. Seattle-Tacoma-Bellevue, WA	Allegiance Telecom; *AT&T*; *Eschelon Telecom*; Focal Communications; Global Crossing; ICG Communications; IDT/Winstar Communications; Integra Telecom; MCI; McLeodUSA; Pac-West Telecomm; SBC Telecom; Time Warner Telecom; XO **CLECs: 14** **Operational Networks: 17** **On-Net Networks: 2**
16. Minneapolis-St. Paul-Bloomington, MN-WI	Allegiance Telecom; *AT&T*; *Eschelon Telecom*; Focal Communications; Global Crossing; IDT/Winstar Communications; Integra Telecom; KMC Telecom; MCI; *McLeodUSA*; SBC Telecom; Time Warner Telecom; *XO* **CLECs: 13** **Operational Networks: 15** **On-Net Networks: 4**
17. San Diego-Carlsbad-San Marcos, CA	Allegiance Telecom; AT&T; Cox Communications; Global Crossing; *ICG Communications*; MCI; Mpower Communications; Pac-West Telecomm; Qwest Communications; *RCN*; Time Warner Telecom; US Telepacific; XO **CLECs: 13** **Operational Networks: 13** **On-Net Networks: 5**
18. St. Louis, MO-IL	AT&T; Allegiance Telecom; *Birch Telecom*; Global Crossing; IDT/Winstar Communications; MCI; McLeodUSA; NuVox Communications; Qwest Communications; XO **CLECs: 10** **Operational Networks: 13** **On-Net Networks: 1**

MSA	CLEC Networks – 2004
19. Baltimore-Towson, MD	Allegiance Telecom; AT&T; *Cavalier Telephone*; Comcast Business Communications; Focal Communications; Global Crossing; IDT/Winstar Communications; MCI; *PaeTec*; Qwest Communications; *RCN*; *SBC Telecom*; US LEC; XO **CLECs: 14** **Operational Networks: 11** **On-Net Networks: 5**
20. Pittsburgh, PA	Allegiance Telecom; AT&T; Choice One Communications; MCI; *PaeTec*; Qwest Communications; US LEC **CLECs: 7** **Operational Networks: 6** **On-Net Networks: 1**
21. Tampa-St. Petersburg-Clearwater, FL	Allegiance Telecom; AT&T; *Eagle Communications*; *Florida Digital Network*; Global Crossing; IDT/Winstar Communications; *ITC^DeltaCom*; KMC Telecom; MCI; Mpower Communications; *NewSouth Communications*; SBC Telecom; Time Warner Telecom; *US LEC*; XO **CLECs: 15** **Operational Networks: 14** **On-Net Networks: 8**
22. Denver-Aurora, CO	Allegiance Telecom; AT&T; Eschelon Telecom; Global Crossing; ICG Communications; IDT/Winstar Communications; MCI; McLeodUSA; Pac-West Telecomm; SBC Telecom; Time Warner Telecom; Verizon; XO **CLECs: 13** **Operational Networks: 19**
23. Cleveland-Elyria-Mentor, OH	Allegiance Telecom; AT&T; Cablevision Lightpath; CoreComm; Focal Communications; Global Crossing; ICG Communications; MCI; *Mpower Communications*; Qwest Communications; XO **CLECs: 11** **Operational Networks: 11** **On-Net Networks: 1**
24. Cincinnati-Middletown, OH-KY-IN	AT&T; Global Crossing; ICG Communications; IDT/Winstar Communications; MCI; NuVox Communications; Time Warner Telecom **CLECs: 7** **Operational Networks: 7**
25. Portland-Vancouver-Beaverton, OR-WA	Allegiance Telecom; AT&T; Eschelon Telecom; Global Crossing; *Integra Telecom*; MCI; McLeodUSA; RIO Communications; SBC Telecom; Time Warner Telecom; XO **CLECs: 11** **Operational Networks: 13** **On-Net Networks: 1**
26. Kansas City, MO-KS	*AT&T; Birch Telecom*; Everest Connections; Global Crossing; MCI; NuVox Communications; Qwest Communications **CLECs: 7** **Operational Networks: 10** **On-Net Networks: 3**
27. Sacramento-Arden-Arcade-Roseville, CA	Allegiance Telecom; AT&T; Global Crossing; ICG Communications; MCI; *Mpower Communications*; Pac-West Telecomm; Qwest Communications; Time Warner Telecom; *XO* **CLECs: 10** **Operational Networks: 12** **On-Net Networks: 2**
28. San Jose-Sunnyvale-Santa Clara, CA	Allegiance Telecom; AT&T; *Focal Communications*; Global Crossing; *ICG Communications*; *MCI*; Mpower Communications; Pac-West Telecomm; Qwest Communications; US Telepacific; *XO* **CLECs: 11** **Operational Networks: 11** **On-Net Networks: 10**
29. San Antonio, TX	Allegiance Telecom; AT&T; *Birch Telecom*; Grande Communications Network; ICG Communications; IDT/Winstar Communications; *ITC^DeltaCom*; Logix Communications; MCI; McLeodUSA; *Mpower Communications*; Qwest Communications; Time Warner Telecom; XO **CLECs: 14** **Operational Networks: 12** **On-Net Networks: 3**

MSA	CLEC Networks – 2004
30. Orlando, FL	AT&T; *Florida Digital Network*; Grande Communications Network; *ITC^DeltaCom*; MCI; *NewSouth Communications*; Orlando Telephone; PaeTec; SBC Telecom; Time Warner Telecom; US LEC Corp.; XO **CLECs: 12** **Operational Networks: 10** **On-Net Networks: 6**
31. Columbus, OH	Choice One Communications; Global Crossing; ICG Communications; ITC^DeltaCom; Knology Broadband; McLeodUSA; *Mpower Communications*; NuVox Communications; Time Warner Telecom; XO **CLECs: 10** **Operational Networks: 9** **On-Net Networks: 1**
32. Providence-New Bedford-Fall River, RI-MA	AT&T; Choice One Communications; Conversent Communications; *CTC Communications*; MCI; *PaeTec*; *RNK Telecom* **CLECs: 7** **Operational Networks: 5** **On-Net Networks: 3**
33. Virginia Beach-Norfolk-Newport News, VA-NC	*Cavalier Telephone*; Cox Communications; KMC Telecom; *SBC Telecom*; *US LEC* **CLECs: 5** **Operational Networks: 4** **On-Net Networks: 3**
34. Indianapolis, IN	AT&T; Choice One Communications; Global Crossing; IDT/Winstar Communications; MCI; McLeodUSA; NuVox Communications; Qwest Communications; Time Warner Telecom **CLECs: 9** **Operational Networks: 9**
35. Milwaukee-Waukesha-West Allis, WI	AT&T; Choice One Communications; Global Crossing; MCI; *McLeodUSA*; Time Warner Telecom **CLECs: 6** **Operational Networks: 6** **On-Net Networks: 1**
36. Las Vegas-Paradise, NV	*Eagle Communications*; Mpower Communications; Pac-West Telecomm; SBC Telecom; US Telepacific; XO **CLECs: 6** **Operational Networks: 5** **On-Net Networks: 1**
37. Charlotte-Gastonia-Concord, NC-SC	AT&T; *Birch Telecom*; *Eagle Communications*; Global Crossing; ICG Communications; *ITC^DeltaCom*; NewSouth Communications; NuVox Communications; SBC Telecom; Time Warner Telecom; US LEC; Verizon **CLECs: 12** **Operational Networks: 9** **On-Net Networks: 4**
38. New Orleans-Metairie-Kenner, LA	Cox Communications; *ITC^DeltaCom*; *McLeodUSA*; NewSouth Communications; US LEC; Xspedius **CLECs: 6** **Operational Networks: 4** **On-Net Networks: 2**
39. Nashville-Davidson-Murfreesboro, TN	AT&T; *Birch Telecom*; *Eagle Communications*; ICG Communications; ITC^DeltaCom; NewSouth Communications; NuVox Communications; SBC Telecom; US LEC; XO; *Xspedius* **CLECs: 11** **Operational Networks: 10** **On-Net Networks: 3**
40. Austin-Round Rock, TX	Allegiance Telecom; AT&T; *Birch Telecom*; Grande Communications; ICG Communications; *ITC^DeltaCom*; Logix Communications; MCI; McLeodUSA; *Mpower Communications*; Qwest Communications; Time Warner Telecom.; XO **CLECs: 13** **Operational Networks: 11** **On-Net Networks: 3**

MSA	CLEC Networks – 2004
41. Memphis, TN-AR-MS	*Birch Telecom*; *Eagle Communications*; ICG Communications; *ITC^DeltaCom*; MCI; *Mpower Communications*; *NewSouth Communications*; NuVox Communications; SBC Telecom; Time Warner Telecom; US LEC; XO; Xspedius **CLECs: 13** **Operational Networks: 8** **On-Net Networks: 5**
42. Buffalo-Cheektowaga-Tonawanda, NY	AT&T; Broadview Networks; Choice One Communications; *CTC Communications Group*; *Eagle Communications*; MCI; *SBC Telecom* **CLECs: 7** **Operational Networks: 4** **On-Net Networks: 3**
43. Louisville, KY-IN	AT&T; ICG Communications; NewSouth Communications; NuVox Communications; SBC Telecom; US LEC **CLECs: 6** **Operational Networks: 6**
44. Hartford-West Hartford-East Hartford, CT	AT&T; Choice One Communications; Conversent Communications; Cox Communications; MCI **CLECs: 5** **Operational Networks: 6**
45. Jacksonville, FL	AT&T; *Florida Digital Network*; *ITC^DeltaCom*; NewSouth Communications; NuVox Communications; US LEC **CLECs: 6** **Operational Networks: 6** **On-Net Networks: 3**
46. Richmond, VA	AT&T; Cavalier Telephone; Cox Communications; US LEC **CLECs: 4** **Operational Networks: 5**
47. Oklahoma City, OK	*Birch Telecom*; Cox Communications; Logix Communications; MCI; McLeodUSA; NuVox Communications **CLECs: 6** **Operational Networks: 5** **On-Net Networks: 1**
48. Birmingham-Hoover, AL	AT&T; *Birch Telecom*; ICG Communications; ITC^DeltaCom; NewSouth Communications; US LEC; *Xspedius* **CLECs: 7** **Operational Networks: 5** **On-Net Networks: 4**
49. Rochester, NY	AT&T; Choice One Communications; *Eagle Communications*; Global Crossing; PaeTec; Time Warner Telecom **CLECs: 6** **Operational Networks: 5** **On-Net Networks: 1**
50. Salt Lake City, UT	AT&T; Eschelon Telecom; ICG Communications; Integra Telecom; MCI; McLeodUSA; SBC Telecom; XO **CLECs: 8** **Operational Networks: 9**
51. Bridgeport-Stamford-Norwalk, CT	AT&T; *Cablevision Lightpath*; Choice One Communications; IDT/Winstar Communications; MCI; Paetec **CLECs: 5** **Operational Networks: 4** **On-Net Networks: 5**
52. Honolulu, HI	Time Warner Telecom **CLECs: 1** **Operational Networks: 1**
53. Tulsa, OK	*Birch Telecom*; Cox Communications; Logix Communications; MCI; *McLeodUSA*; NuVox Communications **CLECs: 6** **Operational Networks: 4** **On-Net Networks: 3**

MSA	CLEC Networks – 2004
54. Dayton, OH	*AT&T*; Choice One Communications; ICG Communications; KMC Telecom; NuVox Communications; Time Warner Telecom **CLECs: 5** **Operational Networks: 5** **On-Net Networks: 1**
55. Tucson, AZ	Cox Communications; MCI; *McLeodUSA*; Time Warner Telecom **CLECs: 4** **Operational Networks: 3** **On-Net Networks: 1**
56. Albany-Schenectady-Troy, NY	AT&T; Broadview Networks; *Choice One Communications*; PaeTec; Qwest Communications; Time Warner Telecom **CLECs: 6** **Operational Networks: 6** **On-Net Networks: 1**
57. New Haven-Milford, CT	*AT&T*; Choice One Communications; *Conversent Communications*; *PaeTec* **CLECs: 4** **Operational Networks: 3** **On-Net Networks: 3**
58. Fresno, CA	ICG Communications; MCI; Pac-West Telecomm; Time Warner Telecom **CLECs: 4** **Operational Networks: 3** **On-Net Networks: 1**
59. Raleigh-Cary, NC	AT&T; *Eagle Communications*; *ITC^DeltaCom*; *NewSouth Communications*; NuVox Communications; SBC Telecom; Time Warner Telecom; US LEC Corp.; Verizon **CLECs: 9** **Operational Networks: 7** **On-Net Networks: 4**
60. Omaha-Council Bluffs, NE	AT&T; Cox Communications; *McLeodUSA* **CLECs: 3** **Operational Networks: 3** **On-Net Networks: 1**
61. Oxnard-Thousand Oaks-Ventura, CA	*ICG Communications; Time Warner Telecom* **CLECs: 2** **On-Net Networks: 2**
62. Worcester, MA	AT&T; Choice One Communications; Lightship Telecom; *PaeTec* **CLECs: 4** **Operational Networks: 4** **On-Net Networks: 1**
63. Grand Rapids-Wyoming, MI	Choice One Communications; MCI **CLECs: 2** **Operational Networks: 2**
64. Allentown-Bethlehem-Easton, PA	Choice One Communications; *RCN*; *XO* **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 3**
65. Albuquerque, NM	MCI; McLeodUSA; *NTS Communications*; Time Warner Telecom; XO **CLECs: 5** **Operational Networks: 4** **On-Net Networks: 1**

MSA	CLEC Networks – 2004
66. Baton Rouge, LA	Cox Communications; *ITC^DeltaCom*; KMC Telecom; *NewSouth Communications*; Xpedius **CLECs: 5** **Operational Networks: 3** **On-Net Networks: 2**
67. Akron, OH	Choice One Communications; Global Crossing; ICG Communications; KMC Telecom; NuVox Communications; *XO* **CLECs: 6** **Operational Networks: 5** **On-Net Networks: 1**
68. Springfield, MA	AT&T; Choice One Communications; *CTC Communications Group*; *Eagle Communications*; MCI; *RNK Telecom* **CLECs: 6** **Operational Networks: 3** **On-Net Networks: 5**
69. El Paso, TX	*Birch Telecom*; Grande Communications; *McLeodUSA* **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 3**
70. Bakersfield, CA	AT&T; MCI; *Pac-West Telecomm*; Time Warner Telecom **CLECs: 4** **Operational Networks: 3** **On-Net Networks: 1**
71. Toledo, OH	*Buckeye TeleSystem*; ICG Communications; KMC Telecom; MCI **CLECs: 4** **Operational Networks: 4** **On-Net Networks: 1**
72. Syracuse, NY	AT&T; Broadview Networks; Choice One Communications; Eagle Communications **CLECs: 4** **Operational Networks: 4**
73. Columbia, SC	*Birch Telecom*; ITC^DeltaCom; KMC Telecom; *NewSouth Communications*; NuVox Communications; Time Warner Telecom **CLECs: 6** **Operational Networks: 5** **On-Net Networks: 2**
74. Greensboro-High Point, NC	AT&T; *Birch Telecom*; *Eagle Communications*; *ITC^DeltaCom*; KMC Telecom; NewSouth Communications; NuVox Communications; Time Warner Telecom; US LEC; Xspedius **CLECs: 10** **Operational Networks: 9** **On-Net Networks: 3**
75. Poughkeepsie-Newburgh-Middletown, NY-PA	Not Available
76. Knoxville, TN	AT&T; *Birch Telecom*; *Eagle Communications*; *ITC^DeltaCom*; MCI; *NewSouth Communications*; NuVox Communications; US LEC **CLECs: 8** **Operational Networks: 4** **On-Net Networks: 4**
77. Little Rock-North Little Rock, AR	*ITC^DeltaCom*; MCI; *McLeodUSA*; NuVox Communications **CLECs: 4** **Operational Networks: 2** **On-Net Networks: 2**

MSA	CLEC Networks – 2004
78. Youngstown-Warren-Boardman, OH	Choice One Communications **CLECs: 1** **Operational Networks: 1**
79. Sarasota-Bradenton-Venice, FL	*ITC^DeltaCom*; KMC Telecom **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 1**
80. Wichita, KS	Birch Telecom; NuVox Communications **CLECs: 2** **Operational Networks: 3**
81. McAllen-Edinburg-Pharr, TX	*Birch Telecom*; Grande Communications; McLeodUSA **CLECs: 2** **Operational Networks: 2** **On-Net Networks: 1**
82. Stockton, CA	MCI; Pac-West Telecomm; *Time Warner Telecom* **CLECs: 3** **Operational Networks: 2** **On-Net Networks: 1**
83. Scranton-Wilkes-Barre, PA	Choice One Communications; *XO* **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 1**
84. Greenville, SC	*Birch Telecom*; *ITC^DeltaCom*; NewSouth Communications; NuVox Communications **CLECs: 4** **Operational Networks: 3** **On-Net Networks: 2**
85. Charleston-North Charleston, SC	*ITC^DeltaCom*; KMC Telecom; Knology Broadband; NewSouth Communications; US LEC **CLECs: 5** **Operational Networks: 5** **On-Net Networks: 1**
86. Colorado Springs, CO	ICG Communications; McLeodUSA; *SunWest Communications* **CLECs: 3** **Operational Networks: 3** **On-Net Networks: 1**
87. Harrisburg-Carlisle, PA	Cavalier Telephone; Choice One Communications; *XO* **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 2**
88. Madison, WI	Choice One Communications; KMC Telecom; McLeodUSA **CLECs: 3** **Operational Networks: 3**
89. Augusta-Richmond County, GA	*Birch Telecom*; *ITC^DeltaCom*; KMC Telecom; Knology Broadband; *NewSouth Communications* **CLECs: 5** **Operational Networks: 2** **On-Net Networks: 3**
90. Jackson, MS	*ITC^DeltaCom*; MCI; *NewSouth Communications*; Xspedius **CLECs: 4** **Operational Networks: 2** **On-Net Networks: 2**

MSA	CLEC Networks – 2004
91. Portland-South Portland, ME	Choice One Communications; Conversent Communications; *CTC Communications Group*; Lightship Telecom; MCI **CLECs: 5** **Operational Networks: 4** **On-Net Networks: 1**
92. Lakeland-Winter Haven, FL	NewSouth Communications **CLECs: 1** **Operational Networks: 1**
93. Des Moines, IA	McLeodUSA **CLECs: 1** **Operational Networks: 1**
94. Chattanooga TN-GA	AT&T; *Birch Telecom*; *ITC^DeltaCom*; KMC Telecom; US LEC **CLECs: 5** **Operational Networks: 3** **On-Net Networks: 2**
95. Palm Bay-Melbourne-Titusville, FL	*Florida Digital Network*; *ITC^DeltaCom*; KMC Telecom **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 5**
96. Lancaster, PA	*Cavalier Telephone*; *Choice One Communications*; XO **CLECs: 3** **Operational Networks: 2** **On-Net Networks: 1**
97. Boise City-Nampa, ID	McLeodUSA; Time Warner Telecom **CLECs: 2** **Operational Networks: 2**
98. Santa Rosa-Petaluma, CA	*ICG Communications* **CLECs: 1** **On-Net Networks: 1**
99. Lansing-East Lansing, MI	Choice One Communications; KMC Telecom; MCI **CLECs: 3** **Operational Networks: 3**
100. Modesto, CA	Not Available
101. Deltona-Daytona Beach-Ormond Beach, FL	*Florida Digital Network*; *ITC^DeltaCom*; KMC Telecom; *PaeTec*; *US LEC* **CLECs: 6** **Operational Networks: 1** **On-Net Networks: 6**
102. Ogden-Clearfield, UT	*McLeodUSA* **CLECs: 1** **On-Net Networks: 1**
103. Cape Coral-Fort Myers, FL	*ITC^DeltaCom*; KMC Telecom **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 1**
104. Flint, MI	Not Available
105. Durham, NC	*Eagle Communications*; *ITC^DeltaCom*; MCI **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 3**

MSA	CLEC Networks – 2004
106. Winston-Salem, NC	*ITC^DeltaCom*; KMC Telecom; NuVox Communications; Xspedius **CLECs: 4** **Operational Networks: 3** **On-Net Networks: 2**
107. Spokane, WA	McLeodUSA; Time Warner Telecom; XO **CLECs: 3** **Operational Networks: 3**
108. Pensacola-Ferry Pass-Brent, FL	*ITC^DeltaCom*; *KMC Telecom*; *NewSouth Communications* **CLECs: 3** **On-Net Networks: 3**
109. Lexington-Fayette, KY	ICG Communications; NuVox Communications **CLECs: 2** **Operational Networks: 2**
110. Canton-Massillon, OH	*XO* **CLECs: 1** **On-Net Networks: 1**
111. Corpus Christi, TX	*Birch Telecom*; Grande Communications; ICG Communications; KMC Telecom; *McLeodUSA* **CLECs: 5** **Operational Networks: 3** **On-Net Networks: 3**
112. Salinas, CA	*Pac-West Telecomm* **CLECs: 1** **On-Net Networks: 1**
113. Mobile, AL	*Birch Telecom*; *ITC^DeltaCom*; NewSouth Communications; US LEC; Xspedius **CLECs: 5** **Operational Networks: 3** **On-Net Networks: 2**
114. Santa Barbara-Santa Maria-Goleta, CA	Cox Communications; ICG Communications; Time Warner Telecom **CLECs: 3** **Operational Networks: 3**
115. Vallejo-Fairfield, CA	Not Available
116. Fort Wayne, IN	Choice One Communications; KMC Telecom **CLECs: 2** **Operational Networks: 2**
117. Beaumont-Port Arthur, TX	*Birch Telecom*; Grande Communications; *ITC^DeltaCom* **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 3**
118. York-Hanover, PA	Not Available
119. Manchester-Nashua, NH	Choice One Communications; Conversent Communications; *CTC Communications Group*; Lightship Telecom; MCI; *PaeTec* **CLECs: 6** **Operational Networks: 5** **On-Net Networks: 2**
120. Provo-Orem, UT	*XO* **CLECs: 1** **On-Net Networks: 1**
121. Davenport-Moline-Rock Island, IA-IL	McLeodUSA **CLECs: 1** **Operational Networks: 1**

MSA	CLEC Networks – 2004
122. Shreveport-Bossier City, LA	*ITC^DeltaCom*; KMC Telecom; Xspedius **CLECs: 3** **Operational Networks: 2** **On-Net Networks: 1**
123. Reading, PA	*XO* **CLECs: 1** **On-Net Networks: 1**
124. Asheville, NC	*ITC^DeltaCom*; *NewSouth Communications*; *US LEC* **CLECs: 3** **On-Net Networks: 3**
125. Springfield, MO	Global Crossing; MCI; McLeodUSA; NuVox Communications **CLECs: 4** **Operational Networks: 4**
126. Visalia-Porterville, CA	Not Available
127. Peoria, IL	*McLeodUSA* **CLECs: 1** **On-Net Networks: 1**
128. Trenton-Ewing, NJ	*Cavalier Telephone* **CLECs: 1** **On-Net Networks: 2**
129. Salem, OR	AT&T; *Eschelon Telecom*; *Integra Telecom* **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 2**
130. Fayetteville-Springdale-Rogers, AR-MO	*McLeodUSA* **CLECs: 1** **On-Net Networks: 1**
131. Montgomery, AL	*Birch Telecom*; ITC^DeltaCom; KMC Telecom; Knology Broadband; *NewSouth Communications*; *US LEC*; Xspedius **CLECs: 7** **Operational Networks: 4** **On-Net Networks: 3**
132. Reno-Sparks, NV	MCI **CLECs: 1** **Operational Networks: 1**
133. Evansville, IN-KY	AT&T; *Choice One Communications*; *McLeodUSA*; Sigecom-CLEC **CLECs: 4** **Operational Networks: 2** **On-Net Networks: 2**
134. Huntsville, AL	*ITC^DeltaCom*; KMC Telecom; Knology Broadband; *US LEC* **CLECs: 4** **Operational Networks: 2** **On-Net Networks: 2**
135. Hickory-Morganton-Lenoir, NC	*US LEC* **CLECs: 1** **On-Net Networks: 1**
136. Fayetteville, NC	*ITC^DeltaCom*; KMC Telecom; Time Warner Telecom **CLECs: 3** **Operational Networks: 2** **On-Net Networks: 1**

MSA	CLEC Networks – 2004
137. Brownsville-Harlingen, TX	*Birch Telecom*; Grande Communications **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 2**
138. Killeen-Temple-Fort Hood, TX	Not Available
139. Eugene-Springfield, OR	AT&T; *Eschelon Telecom*; *McLeodUSA*; RIO Communications **CLECs: 4** **Operational Networks: 2** **On-Net Networks: 2**
140. Ann Arbor, MI	Choice One Communications; KMC Telecom; *Mpower* **CLECs: 3** **Operational Networks: 2** **On-Net Networks 1**
141. Tallahassee, FL	*ITC^DeltaCom*; KMC Telecom **CLECs: 2** **Operational CLEC Networks: 1** **On-Net CLEC Networks: 2**
142. Rockford, IL	Choice One Communications; *McLeodUSA* **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 1**
143. Anchorage, AK	General Communications **CLECs: 1** **Operational Networks: 1**
144. Port St. Lucie-Fort Pierce, FL	Cox Communications; *Florida Digital Networks* **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 2**
145. South Bend-Mishawaka, IN-MI	Choice One Communications; *McLeodUSA* **CLECs: 2** **Operational Networks: 1** **On-Net Networks: 1**
146. Kalamazoo-Portage, MI	Choice One Communications **CLECs: 1** **Operational Networks: 1**
147. Charleston, WV	Not Available
148. Utica-Rome, NY	Not Available
149. Savannah, GA	*ITC^DeltaCom*; KMC Telecom; *NewSouth Communications* **CLECs: 3** **Operational Networks: 1** **On-Net Networks: 2**
150. Huntington-Ashland, WV-KY-OH	Not Available
Sources: *See* Appendix H.	

APPENDIX E. COMPETITIVE FIBER-BASED COLLOCATION BY MSA

Rank	MSA	BOC	Percentage of Wire Centers and Access Lines Served by One or More Fiber-Based CLEC Collocation Nodes		
			% of All WCs	% of Total Lines	% of All Bus. Lines
1	New York-Northern New Jersey-Long Island, NY-NJ-PA	Verizon	31%	52%	
2	Los Angeles-Long Beach-Santa Ana, CA	SBC	57%	74%	76%
3	Chicago-Naperville-Joliet, IL-IN-WI	SBC	25%	53%	63%
4	Philadelphia-Camden-Wilmington, PA-NJ-DE	Verizon	35%	59%	
5	Dallas-Fort Worth-Arlington, TX	SBC	24%	53%	60%
6	Miami-Fort Lauderdale-Miami Beach, FL	BellSouth	87%	97%	97%
7	Washington-Arlington-Alexandria, DC-VA-MD	Verizon	26%	54%	
8	Houston-Baytown-Sugar Land, TX	SBC	32%	65%	70%
9	Detroit-Warren-Livonia, MI	SBC	25%	44%	48%
10	Boston-Cambridge-Quincy, MA-NH	Verizon	34%	56%	
11	Atlanta-Sandy Springs-Marietta, GA	BellSouth	24%	47%	61%
12	San Francisco-Oakland-Fremont, CA	SBC	29%	54%	66%
13	Riverside-San Bernardino-Ontario, CA	SBC	36%	49%	54%
14	Phoenix-Mesa-Scottsdale, AZ	Qwest	44%	76%	86%
15	Seattle-Tacoma-Bellevue, WA	Qwest	63%	72%	67%
16	Minneapolis-St. Paul-Bloomington, MN-WI	Qwest	66%	83%	93%
17	San Diego-Carlsbad-San Marcos, CA	SBC	25%	50%	58%
18	St. Louis, MO-IL	SBC	19%	41%	53%
19	Baltimore-Towson, MD	Verizon	20%	34%	
20	Pittsburgh, PA	Verizon	37%	71%	
22	Denver-Aurora, CO	Qwest	67%	83%	88%
23	Cleveland-Elyria-Mentor, OH	SBC	31%	52%	66%
24	Cincinnati-Middletown, OH-KY-IN	SBC	0%	0%	0%
25	Portland-Vancouver-Beaverton, OR-WA	Qwest	62%	83%	87%
26	Kansas City, MO-KS	SBC	24%	49%	60%
27	Sacramento--Arden-Arcade--Roseville, CA	SBC	17%	48%	61%
28	San Jose-Sunnyvale-Santa Clara, CA	SBC	48%	69%	83%
29	San Antonio, TX	SBC	21%	61%	68%
30	Orlando, FL	BellSouth	73%	91%	95%
31	Columbus, OH	SBC	38%	77%	85%
32	Providence-New Bedford-Fall River, RI-MA	Verizon	27%	48%	
33	Virginia Beach-Norfolk-Newport News, VA-NC	Verizon	15%	27%	
34	Indianapolis, IN	SBC	17%	52%	68%
35	Milwaukee-Waukesha-West Allis, WI	SBC	53%	76%	82%
37	Charlotte-Gastonia-Concord, NC-SC	BellSouth	50%	82%	88%
38	New Orleans-Metairie-Kenner, LA	BellSouth	31%	62%	72%
39	Nashville-Davidson--Murfreesboro, TN	BellSouth	36%	73%	81%
40	Austin-Round Rock, TX	SBC	17%	57%	65%
41	Memphis, TN-MS-AR	BellSouth	48%	80%	85%
42	Buffalo-Niagara Falls, NY	Verizon	28%	64%	
43	Louisville, KY-IN	BellSouth	22%	54%	68%
44	Hartford-West Hartford-East Hartford, CT	SBC	11%	24%	36%
45	Jacksonville, FL	BellSouth	44%	67%	77%
46	Richmond, VA	Verizon	20%	49%	
47	Oklahoma City, OK	SBC	20%	49%	61%
48	Birmingham-Hoover, AL	BellSouth	21%	36%	53%
50	Salt Lake City, UT	Qwest	75%	89%	94%
51	Bridgeport-Stamford-Norwalk, CT	SBC	0%	0%	0%

Rank	MSA	BOC	Percentage of Wire Centers and Access Lines Served by One or More Fiber-Based CLEC Collocation Nodes		
			% of All WCs	% of Total Lines	% of All Bus. Lines
51	Bridgeport-Stamford-Norwalk, CT	Verizon	100%	100%	
53	Tulsa, OK	SBC	13%	53%	67%
54	Dayton, OH	SBC	17%	43%	58%
56	Albany-Schenectady-Troy, NY	Verizon	30%	76%	
57	New Haven-Milford, CT	SBC	4%	16%	29%
59	Raleigh-Cary, NC	BellSouth	53%	79%	87%
60	Omaha-Council Bluffs, NE-IA	Qwest	29%	53%	63%
62	Worcester, MA	Verizon	38%	67%	
64	Allentown-Bethlehem-Easton, PA-NJ	Verizon	26%	57%	
66	Baton Rouge, LA	BellSouth	25%	61%	73%
68	Springfield, MA	Verizon	17%	56%	
72	Syracuse, NY	Verizon	27%	56%	
73	Columbia, SC	BellSouth	29%	56%	68%
74	Greensboro-High Point, NC	BellSouth	31%	69%	85%
75	Poughkeepsie-Newburgh-Middletown, NY	Verizon	9%	29%	
76	Knoxville, TN	BellSouth	33%	60%	72%
78	Youngstown-Warren-Boardman, OH-PA	Verizon	17%	49%	
83	Scranton--Wilkes-Barre, PA	Verizon	35%	74%	
84	Greenville, SC	BellSouth	10%	32%	46%
85	Charleston-North Charleston, SC	BellSouth	54%	73%	82%
87	Harrisburg-Carlisle, PA	Verizon	53%	84%	
89	Augusta-Richmond County, GA-SC	BellSouth	17%	37%	49%
90	Jackson, MS	BellSouth	23%	50%	67%
91	Portland-South Portland, ME	Verizon	6%	24%	
94	Chattanooga, TN-GA	BellSouth	23%	46%	66%
95	Palm Bay-Melbourne-Titusville, FL	BellSouth	56%	83%	85%
96	Lancaster, PA	Verizon	33%	70%	
101	Deltona-Daytona Beach-Ormond Beach, FL	BellSouth	33%	68%	79%
105	Durham, NC	BellSouth	100%	100%	100%
106	Winston-Salem, NC	BellSouth	50%	78%	82%
108	Pensacola-Ferry Pass-Brent, FL	BellSouth	25%	55%	68%
118	York-Hanover, PA	Verizon	18%	45%	
119	Manchester-Nashua, NH	Verizon	23%	68%	
123	Reading, PA	Verizon	31%	65%	
	AVERAGE		**33%**	**59%**	**68% (excl. Verizon)**

Data for the 25 largest MSAs served by Verizon (in the former Bell Atlantic service area), SBC, and BellSouth. Qwest data were available for only seven MSAs.

APPENDIX F. COMPETITIVE COLLOCATION PROVIDERS IN THE TOP 50 MSAs

MSA (rank)	Competitive Collocation Providers (number of collocation centers in MSA)*
New York-Newark-Edison, NY-NJ-PA (1)	Switch and Data (3); TELEHOUSE America (3); FiberNet Telecom (3); Equinix (2); Internap; Access^{IT} (3); Tel^{X}; MetroNexus; Cogent/PSInet; Level 3 (2); NEON Communications; Tyco Telecommunications; CRG West; GI Partners; NTT/Verio; Navisite
Los Angeles-Long Beach-Santa Ana, CA (2)	Switch and Data; TELEHOUSE America; FiberNet Telecom; Equinix (2); Cogent/PSInet; Level 3 (2); Tyco Telecommunications; CRG West; GI Partners; NTT/Verio; Navisite; C I Host
Chicago-Naperville-Joliet, IL-IN-WI (3)	Switch and Data (2); Equinix; Layerone; Level 3; Navisite (2); C I Host
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD (4)	Switch and Data (2); Level 3; InFlow
Dallas-Fort Worth-Arlington, TX (5)	Switch and Data (2); Equinix; Layerone; Collocation Solutions; Level 3; Colo4Dallas; GI Partners; Navisite; C I Host
Miami-Fort Lauderdale-Miami Beach, FL (6)	Switch and Data; Layerone; Level 3; Primus; GI Partners; NTT/Verio
Washington-Arlington-Alexandria, DC-VA-MD-WV (7)	Switch and Data (3); Equinix; Cogent/PSInet; Level 3; Primus; NTT/Verio; Navisite
Houston-Baytown-Sugar Land, TX (8)	Internap; MetroNexus; Level 3; Navisite; Texas.net
Detroit-Warren-Livonia, MI (9)	Switch and Data; Cogent/PSInet; Level 3
Boston-Cambridge-Quincy, MA-NH (10)	Switch and Data; Internap; Level 3; NEON Communications; Primus; Navisite
Atlanta-Sandy Springs-Marietta, GA (11)	Switch and Data; Internap; Tel^{X} ; MetroNexus; Level 3; InFlow
San Francisco-Oakland-Fremont, CA (12)	Switch and Data; eXchange; Level 3 (2); ColoServe (2); NTT/Verio; Navisite; 365 Main
Riverside-San Bernardino-Ontario, CA (13)	n/a
Phoenix-Mesa-Scottsdale, AZ (14)	Switch and Data; Level 3; InFlow; ViaWest
Seattle-Tacoma-Bellevue, WA (15)	Switch and Data (2); Internap; Level 3
Minneapolis-St. Paul-Bloomington, MN-WI (16)	InFlow
San Diego-Carlsbad-San Marcos, CA (17)	Level 3; InFlow; NTT/Verio
St. Louis, MO-IL (18)	Switch and Data; Level 3; InFlow
Baltimore-Towson, MD (19)	Level 3
Pittsburgh, PA (20)	Switch and Data; Cogent/PSInet; InFlow
Tampa-St. Petersburg-Clearwater, FL (21)	Switch and Data; Peak 10; Level 3
Denver-Aurora, CO (22)	Switch and Data; Level 3; InFlow (2); ViaWest
Cleveland-Elyria-Mentor, OH (23)	Switch and Data
Cincinnati-Middletown, OH-KY-IN (24)	Level 3
Portland-Vancouver-Beaverton, OR-WA (25)	InFlow; Tyco Telecommunications
Kansas City, MO-KS (26)	Switch and Data
Sacramento-Arden-Arcade-Roseville, CA (27)	Herakles; RagingWire

MSA (rank)	Competitive Collocation Providers (number of collocation centers in MSA)*
San Jose-Sunnyvale-Santa Clara, CA (28)	Switch and Data; Equinix (2); eXchange; Level 3; Tyco Telecommunications; CRG West; NTT/Verio; Navisite (2)
San Antonio, TX (29)	Colo Solutions
Orlando, FL (30)	Colo Solutions; Level 3
Columbus, OH (31)	Cogent/PSInet
Providence-New Bedford-Fall River, RI-MA (32)	NEON Communications
Virginia Beach-Norfolk-Newport News, VA-NC (33)	n/a
Indianapolis, IN (34)	Switch and Data
Milwaukee-Waukesha-West Allis, WI (35)	Navisite
Las Vegas-Paradise, NV (36)	Collocation Solutions; Navisite; ViaWest
Charlotte-Gastonia-Concord, NC-SC (37)	Peak 10
New Orleans-Metairie-Kenner, LA (38)	n/a
Nashville-Davidson-Murfreesboro, TN (39)	Switch and Data; InFlow
Austin-Round Rock, TX (40)	Collocation Solutions; InFlow; Texas.net
Memphis, TN-MS-AR (41)	Memphis Networx
Buffalo-Cheektowaga-Tonawanda, NY (42)	Switch and Data
Louisville, KY-IN (43)	Colo Solutions; Xodiax
Hartford-West Hartford-East Hartford, CT (44)	NEON Communications
Jacksonville, FL (45)	Colo Solutions; Peak 10
Richmond, VA (46)	n/a
Oklahoma City, OK (47)	n/a
Birmingham-Hoover, AL (48)	n/a
Rochester, NY (49)	NTT/Verio
Salt Lake City, UT (50)	ViaWest

*There may be instances where numerous carriers operate collocation hotels at one location. In these instances, each individual carrier has been separately counted as having a collocation hotel.

Sources: *See* Appendix H.

APPENDIX G. FIXED WIRELESS PROVIDERS BY MSA

MSA	Fixed Wireless Providers*
1. New York-Northern New Jersey-Long Island, NY-NJ-PA	Teligent**; TowerStream; *First Avenue Networks*; *IDT Solutions*
2. Los Angeles-Long Beach-Santa Ana, CA	NextWeb; Teligent; *First Avenue Networks*; *IDT Solutions*
3. Chicago-Naperville-Joliet, IL-IN-WI	Teligent; TowerStream; *First Avenue Networks*; *IDT Solutions*
4. Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	Teligent; *First Avenue Networks*; *IDT Solutions*
5. Dallas-Fort Worth-Arlington, TX	airBand; Teligent; *First Avenue Networks*; *IDT Solutions*
6. Miami-Fort Lauderdale-Miami Beach, FL	Teligent; *First Avenue Networks*; *IDT Solutions*
7. Washington-Arlington-Alexandria, DC-MD-VA-WV	Teligent; *First Avenue Networks*; *IDT Solutions*
8. Houston-Baytown-Sugar Land, TX	airBand; Teligent; *First Avenue Networks*; *IDT Solutions*
9. Detroit-Warren-Livonia, MI	Teligent; *First Avenue Networks*; *IDT Solutions*
10. Boston-Cambridge-Quincy, MA-NH	Teligent; TowerStream; *First Avenue Networks*; *IDT Solutions*
11. Atlanta-Sandy Springs-Marietta, GA	Teligent; *First Avenue Networks*; *IDT Solutions*
12. San Francisco-Oakland-Fremont, CA	NextWeb; Teligent; *First Avenue Networks*; *IDT Solutions*
13. Riverside-San Bernardino-Ontario, CA	*First Avenue Networks*; *IDT Solutions*
14. Phoenix-Mesa-Scottsdale, AZ	airBand; Teligent; *First Avenue Networks*; *IDT Solutions*
15. Seattle-Tacoma- Bellevue, WA	Teligent; *First Avenue Networks*; *IDT Solutions*
16. Minneapolis-St. Paul-Bloomington, MN-WI	Teligent; *First Avenue Networks*; *IDT Solutions*
17. San Diego-Carlsbad-San Marcos, CA	Teligent; *First Avenue Networks*; *IDT Solutions*
18. St. Louis, MO-IL	Teligent; *First Avenue Networks*; *IDT Solutions*
19. Baltimore-Towson, MD	Teligent; *First Avenue Networks*; *IDT Solutions*
20. Pittsburgh, PA	Teligent; *First Avenue Networks*; *IDT Solutions*
21. Tampa-St. Petersburg-Clearwater, FL	Teligent; *First Avenue Networks*; *IDT Solutions*
22. Denver-Aurora, CO	Teligent; *First Avenue Networks*; *IDT Solutions*
23. Cleveland-Elyria-Mentor, OH	Teligent; *First Avenue Networks*; *IDT Solutions*
24. Cincinnati-Middletown, OH-KY-IN	Teligent; *First Avenue Networks*; *IDT Solutions*
25. Portland-Vancouver-Beaverton, OR-WA	Teligent; *First Avenue Networks*; *IDT Solutions*
26. Kansas City, MO-KS	Teligent; *First Avenue Networks*; *IDT Solutions*
27. Sacramento-Arden-Arcade-Roseville, CA	Teligent; *First Avenue Networks*; *IDT Solutions*
29. San Jose-Sunnyvale-Santa Clara, CA	NextWeb; Teligent; *First Avenue Networks*; *IDT Solutions*
29. San Antonio, TX	Teligent; *First Avenue Networks*; *IDT Solutions*
30. Orlando, FL	Teligent; *First Avenue Networks*; *IDT Solutions*
31. Columbus, OH	Teligent; *First Avenue Networks*; *IDT Solutions*
32. Providence-New Bedford-Fall River, RI-MA	TowerStream; *First Avenue Networks*; *IDT Solutions*
33. Virginia Beach-Norfolk-Newport News, VA-NC	Teligent; *First Avenue Networks*; *IDT Solutions*
34. Indianapolis, IN	Teligent; *First Avenue Networks*; *IDT Solutions*
35. Milwaukee-Waukesha-West Allis, WI	Teligent; *First Avenue Networks*; *IDT Solutions*
36. Las Vegas-Paradise, NV	Teligent; SkyBridge Wireless; *First Avenue Networks*; *IDT Solutions*
37. Charlotte-Gastonia-Concord, NC-SC	Teligent; *First Avenue Networks*; *IDT Solutions*
38. New Orleans-Metairie-Kenner, LA	Teligent; *First Avenue Networks*; *IDT Solutions*
39. Nashville-Davidson-Murfreesboro, TN	Teligent; *First Avenue Networks*; *IDT Solutions*
40. Austin-Round Rock, TX	Teligent; *First Avenue Networks*; *IDT Solutions*
41. Memphis, TN-AR-MS	Teligent; *First Avenue Networks*; *IDT Solutions*
42. Buffalo-Cheektowaga-Tonawanda, NY	Teligent; *First Avenue Networks*; *IDT Solutions*
43. Louisville, KY-IN	Teligent; *First Avenue Networks*; *IDT Solutions*
44. Hartford-West Hartford-East Hartford, CT	Teligent; *First Avenue Networks*; *IDT Solutions*
45. Jacksonville, FL	Teligent; *First Avenue Networks*; *IDT Solutions*

MSA	Fixed Wireless Providers*
46. Richmond, VA	Teligent; *First Avenue Networks*; *IDT Solutions*
47. Oklahoma City, OK	Teligent; *First Avenue Networks*; *IDT Solutions*
48. Birmingham-Hoover, AL	Teligent; *First Avenue Networks*; *IDT Solutions*
49. Rochester, NY	Teligent; *First Avenue Networks*; *IDT Solutions*
50. Salt Lake City, UT	Teligent; *First Avenue Networks*; *IDT Solutions*
51. Bridgeport-Stamford-Norwalk, CT	*First Avenue Networks*; *IDT Solutions*
52. Honolulu, HI	Teligent; *First Avenue Networks*; *IDT Solutions*
53. Tulsa, OK	Teligent; *First Avenue Networks*; *IDT Solutions*
54. Dayton, OH	Teligent; *First Avenue Networks*; *IDT Solutions*
55. Tucson, AZ	Teligent; *First Avenue Networks*; *IDT Solutions*
56. Albany-Schenectady-Troy, NY	Teligent; *First Avenue Networks*; *IDT Solutions*
57. New Haven-Milford, CT	Teligent; *First Avenue Networks*; *IDT Solutions*
58. Fresno, CA	Teligent; *First Avenue Networks*; *IDT Solutions*
59. Raleigh-Cary, NC	Teligent; WindChannel; *First Avenue Networks*; *IDT Solutions*
60. Omaha-Council Bluffs, NE	Teligent; *First Avenue Networks*; *IDT Solutions*
61. Oxnard-Thousand Oaks-Ventura, CA	NextWeb; Teligent; *First Avenue Networks*; *IDT Solutions*
62. Worcester, MA	*First Avenue Networks*; *IDT Solutions*
63. Grand Rapids-Wyoming, MI	ISG; *First Avenue Networks*; *IDT Solutions*
64. Allentown-Bethlehem-Easton, PA	Teligent; *First Avenue Networks*; *IDT Solutions*
65. Albuquerque, NM	Teligent; *First Avenue Networks*; *IDT Solutions*
66. Baton Rouge, LA	Teligent; *First Avenue Networks*; *IDT Solutions*
67. Akron, OH	Teligent; *First Avenue Networks*; *IDT Solutions*
68. Springfield, MA	Teligent; *First Avenue Networks*; *IDT Solutions*
69. El Paso, TX	Teligent; *First Avenue Networks*; *IDT Solutions*
70. Bakersfield, CA	*First Avenue Networks*; *IDT Solutions*
71. Toledo, OH	*First Avenue Networks*; *IDT Solutions*
72. Syracuse, NY	Teligent; *First Avenue Networks*; *IDT Solutions*
73. Columbia, SC	Conterra; *First Avenue Networks*; *IDT Solutions*
74. Greensboro-High Point, NC	Teligent; *First Avenue Networks*; *IDT Solutions*
75. Poughkeepsie-Newburgh-Middletown, NY-PA	*First Avenue Networks*; *IDT Solutions*
76. Knoxville, TN	*First Avenue Networks*; *IDT Solutions*
77. Little Rock-North Little Rock, AR	*First Avenue Networks*; *IDT Solutions*
78. Youngstown-Warren-Boardman, OH	*First Avenue Networks*; *IDT Solutions*
79. Sarasota-Bradenton-Venice, FL	*First Avenue Networks*; *IDT Solutions*
80. Wichita, KS	*First Avenue Networks*; *IDT Solutions*
81. McAllen-Edinburg-Pharr, TX	*First Avenue Networks*; *IDT Solutions*
82. Stockton, CA	Teligent; *First Avenue Networks*; *IDT Solutions*
83. Scranton-Wilkes-Barre, PA	*First Avenue Networks*; *IDT Solutions*
84. Greenville, SC	Teligent; *First Avenue Networks*; *IDT Solutions*
85. Charleston-North Charleston, SC	Teligent; *First Avenue Networks*; *IDT Solutions*
86. Colorado Springs, CO	*First Avenue Networks*; *IDT Solutions*
87. Harrisburg-Carlisle, PA	*First Avenue Networks*; *IDT Solutions*
88. Madison, WI	*First Avenue Networks*; *IDT Solutions*
89. Augusta-Richmond County, GA	*First Avenue Networks*; *IDT Solutions*
90. Jackson, MS	*First Avenue Networks*; *IDT Solutions*
91. Portland-South Portland, ME	*First Avenue Networks*; *IDT Solutions*
92. Lakeland-Winter Haven, FL	*First Avenue Networks*; *IDT Solutions*
93. Des Moines, IA	*First Avenue Networks*; *IDT Solutions*
94. Chattanooga, TN-GA	*First Avenue Networks*; *IDT Solutions*

MSA	Fixed Wireless Providers*
95. Palm Bay-Melbourne-Titusville, FL	*First Avenue Networks*; *IDT Solutions*
96. Lancaster, PA	*First Avenue Networks*; *IDT Solutions*
97. Boise City-Nampa, ID	*First Avenue Networks*; *IDT Solutions*
98. Santa Rosa-Petaluma, CA	*First Avenue Networks*; *IDT Solutions*
99. Lansing-East Lansing, MI	*First Avenue Networks*; *IDT Solutions*
100. Modesto, CA	*First Avenue Networks*; *IDT Solutions*
101. Deltona-Daytona Beach- Ormond Beach, FL	*First Avenue Networks*; *IDT Solutions*
102. Ogden-Clearfield, UT	*First Avenue Networks*; *IDT Solutions*
103. Cape Coral-Fort Myers, FL	*First Avenue Networks*; *IDT Solutions*
104. Flint, MI	*First Avenue Networks*; *IDT Solutions*
105. Durham, NC	WindChannel; *First Avenue Networks*; *IDT Solutions*
106. Winston-Salem, NC	*First Avenue Networks*; *IDT Solutions*
107. Spokane, WA	*First Avenue Networks*; *IDT Solutions*
108. Pensacola-Ferry Pass-Brent, FL	*First Avenue Networks*; *IDT Solutions*
109. Lexington-Fayette, KY	*First Avenue Networks*; *IDT Solutions*
110. Canton-Massillon, OH	*First Avenue Networks*; *IDT Solutions*
111. Corpus Christi, TX	*First Avenue Networks*; *IDT Solutions*
112. Salinas, CA	*First Avenue Networks*; *IDT Solutions*
113. Mobile, AL	*First Avenue Networks*; *IDT Solutions*
114. Santa Barbara-Santa Maria-Goleta, CA	NextWeb; Teligent; *First Avenue Networks*; *IDT Solutions*
115. Vallejo-Fairfield, CA	*First Avenue Networks*; *IDT Solutions*
116. Fort Wayne, IN	*First Avenue Networks*; *IDT Solutions*
117. Beaumont-Port Arthur, TX	*First Avenue Networks*; *IDT Solutions*
118. York-Hanover, PA	*First Avenue Networks*; *IDT Solutions*
119. Manchester-Nashua, NH	*First Avenue Networks*; *IDT Solutions*
120. Provo-Orem, UT	*First Avenue Networks*; *IDT Solutions*
121. Davenport-Moline-Rock Island, IA-IL	*First Avenue Networks*; *IDT Solutions*
122. Shreveport-Bossier City, LA	*First Avenue Networks*; *IDT Solutions*
123. Reading, PA	*First Avenue Networks*; *IDT Solutions*
124. Asheville, NC	*First Avenue Networks*; *IDT Solutions*
125. Springfield, MO	*First Avenue Networks*; *IDT Solutions*
126. Visalia-Porterville, CA	*First Avenue Networks*; *IDT Solutions*
127. Peoria, IL	*First Avenue Networks*; *IDT Solutions*
128. Trenton-Ewing, NJ	*First Avenue Networks*; *IDT Solutions*
129. Salem, OR	*First Avenue Networks*; *IDT Solutions*
130. Fayetteville-Springdale-Rogers, AR-MO	*First Avenue Networks*; *IDT Solutions*
131. Montgomery, AL	*First Avenue Networks*; *IDT Solutions*
132. Reno-Sparks, NV	*First Avenue Networks*; *IDT Solutions*
133. Evansville, IN-KY	*First Avenue Networks*; *IDT Solutions*
134. Huntsville, AL	*First Avenue Networks*; *IDT Solutions*
135. Hickory-Morganton-Lenoir, NC	*First Avenue Networks*; *IDT Solutions*
136. Fayetteville, NC	*First Avenue Networks*; *IDT Solutions*
137. Brownsville-Harlingen, TX	*First Avenue Networks*; *IDT Solutions*
138. Killeen-Temple-Fort Hood, TX	*First Avenue Networks*; *IDT Solutions*
139. Eugene-Springfield, OR	*First Avenue Networks*; *IDT Solutions*
140. Ann Arbor, MI	*First Avenue Networks*; *IDT Solutions*
141. Tallahassee, FL	*First Avenue Networks*; *IDT Solutions*
142. Rockford, IL	*First Avenue Networks*; *IDT Solutions*
143. Anchorage, AK	*First Avenue Networks*; *IDT Solutions*

MSA	Fixed Wireless Providers*
144. Port St. Lucie-Fort Pierce, FL	*First Avenue Networks*; *IDT Solutions*
145. South Bend-Mishawaka, IN- MI	*First Avenue Networks*; *IDT Solutions*
146. Kalamazoo-Portage, MI	*First Avenue Networks*; *IDT Solutions*
147. Charleston, WV	*First Avenue Networks*; *IDT Solutions*
148. Utica-Rome, NY	*First Avenue Networks*; *IDT Solutions*
149. Savannah, GA	*First Avenue Networks*; *IDT Solutions*
150. Huntington-Ashland, WV- KY-OH	*First Avenue Networks*; *IDT Solutions*

* Italics indicate that the carrier offers wholesale spectrum and owns spectrum licenses in the MSA (these carriers do not offer commercial retail service).
** Teligent has entered into an agreement to be acquired by First Avenue Networks. *See* First Avenue Networks Press Release, *First Avenue Networks Signs Letter of Intent to Acquire Teligent Assets* (July 8, 2004).
Sources: *See* Appendix H.

APPENDIX H. ADDITIONAL SOURCES

Cited As	***Source***
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Aug. 2004 Bernstein Broadband Update	C. Moffett, *et al.*, Bernstein Research Call, *Broadband Update: Narrower "Availability Gap" Points to RBOC/Cable Share Stabilization* (Aug. 25, 2004)
Balhoff/Legg Mason Testimony	Michael Balhoff, Managing Director, Legg Mason, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC (Feb. 4, 2004)
Bell Atlantic/NYNEX Merger Order	*Applications of NYNEX Corp., Transferor, and Bell Atlantic Corp., Transferee, for Consent To Transfer Control of NYNEX Corp. and Its Subsidiaries*, Memorandum Opinion and Order, 12 FCC Rcd 19985 (1997)
Bernstein Cable Telephony Report	J. Halpern, *et al.*, Bernstein Research Call, *US Telecom & Cable: Faster Roll-Out of Cable Telephony Means More Risk to RBOCs; Faster Growth for Cable* (Dec. 17, 2003)
Bernstein Flat-Rate Pricing Note	J. Halpern, *et al*., Bernstein Research, *U.S. Telecom and Cable: Flat-Rate Pricing Signals Telephony Voice ARPU Compression* (Apr. 8, 2004)
Britt/Time Warner Cable Presentation	Glenn Britt, Chairman & CEO, Time Warner Cable, Presentation to UBS Media Week Conference (Dec. 11, 2003)
CLEC Report 2004	New Paradigm Resources Group, Inc., *CLEC Report 2004* (18th ed. 2004)
Eighth CMRS Report	*Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Eighth Report, 18 FCC Rcd 14873 (2003)
Goldman Sachs Cable Telephony/VoIP Analysis	F. Governali, *et al.*, Goldman Sachs, *Cable Telephony/VoIP Threat Evolves, But Shouldn't Be Catastrophic* (Apr. 16, 2004)
In-Stat/MDR Cable Triple-Play Report	M. Paxton, In-Stat/MDR, *Cable Telephony Service: The Third Leg of Cable's 'Triple Play' Bundle* (Nov. 2003)
In-Stat/MDR Private Line Report	K. Burney, *et al.*, In-Stat/MDR, *Cash Cows Say "Bye-Bye": The Future of Private Line Services in US Businesses* (Dec. 2003)
In-Stat/MDR Small Business Study	K. Burney, In-Stat/MDR, *The Data Nation: Wireline Data Services Spending and Broadband Usage in the US Business Market; Part Three: Small Businesses (5 to 99 Employees)* (Dec. 2003)
July 2003 Goldman Sachs VoIP Report	F. Governali, et al., Goldman Sachs, *VoIP – The Enabler of Real Telecom Competition* (July 7, 2003)
July 2004 Lehman Brothers VoIP Report	B. Bath, Lehman Brothers, *Consumer VoIP Threat Overdone* at Figure 1 (July 1, 2004)

Cited As	***Source***
June 2004 High-Speed Services Report	Ind. Anal. & Tech. Div., WCB, *FCC, High-Speed Services for Internet Access: Status as of December 31, 2003* (June 2004)
June 2004 Local Competition Report	Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of December 31, 2003* (June 2004)
Kagan 1Q04 Cable VoIP Outlook	Kagan, *Cable VoIP Outlook: Q1 '04 Sector Update* (Jan. 2004)
LEA Comments	Comments of the License-Exempt Alliance at 3, ET Docket No. 03-122 (FCC filed Sept. 3, 2003)
Lehman Enterprise Report	R.D. Lynch, *et al.*, Lehman Brothers, *Enterprise Telecom Services* (Nov. 11, 2003)
Louthan/Raymond James Testimony	Frank Louthan, Vice President, Equity Research, Raymond James, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC (Feb. 4, 2004)
Merrill Lynch 3Q03 Broadband Update	G. Campbell, *et al.*, Merrill Lynch, *3Q03 Broadband Update: The Latest on Broadband Data and VoIP Services in the U.S. and Canada* at 2 (Nov. 3, 2003)
Merrill Lynch, Everything over IP	G. Campbell, *et al.*, Merrill Lynch, *Everything over IP: VoIP and Beyond* (Mar. 12, 2004)
Merrill Lynch Voice over Broadband Report	G. Campbell, *et al.*, Merrill Lynch, Investext Rpt. No. 7453992, *Voice over Broadband – The Challenge from VoIP in the Resident –* Industry Report (June 24, 2003)
Ninth CMRS Report	*Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Ninth Report, WT Docket No. 04-111, FCC 04-216 (rel. Sept. 28, 2004)
Parks Associates Residential VoIP Analysis	J. Barrett, *et al.*, Parks Associates, *Residential Voice-over-IP: Analysis & Forecasts* (Jan. 2004)
Pricing Flexibility Order	*Access Charge Reform; Price Cap Performance Review for Local Exchange Carriers*, Fifth Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd 14221 (1999)
Quinton/Merrill Lynch Testimony	Adam Quinton, Managing Director & First Vice President, Co-Head of Global Telecom Services Research, Merrill Lynch, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC (Feb. 4, 2004)
Rutledge/Cablevision Presentation	Tom Rutledge, President, Cable & Communications, Cablevision, Cablevision Presentation at the Bear Stearns Media & Entertainment Conference (Mar. 9, 2004)
Small Business Administration Study	S. Pociask, Telenomic Research, LLC, *A Survey of Small Businesses' Telecommunications Use and Spending* (Mar. 2004)
Telecommunications Industry Revenues Report	J. Lande & K. Lynch, Ind. Anal. & Tech. Div., WCB, FCC, *Telecommunications Industry Revenues 2002* (Mar. 2004)

Cited As	***Source***
Telegeography MANs 2003	Telegeography, *MANs 2003: Metropolitan Area Networks* (Aug. 2002)
Triennial Review Order	*Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978 (2003)
UBS Vonage Story	J. Hodulik, *et al.*, UBS Investment Research, *The Vonage Story: The Who, What, Where, and How* (Nov. 24, 2003)
USTA II	*United States Telecom Ass'n v. FCC*, 359 F.3d 554, 575 (D.C. Cir. 2004)
Verizon July 2 Ex Parte	Ex Parte Letter from M. Glover, Verizon, to Marlene Dortch, FCC, CC Docket Nos. 01-338, 96-98 & 98-147 (July 2, 2004)

I. COMPETITIVE OVERVIEW

Table 1. Competitive Developments

% Homes with Access to Cable Modem. *1999*. P. Huber & E. Leo, *UNE Fact Report* at III-20 & n.54, *attached to* Comments of the United States Telecom Association, CC Docket Nos. 96-98, 95-168 (FCC filed May 26, 1999) ("*UNE Fact Report*"). *2002*. *Triennial Review Order* ¶ 52. *2004*. C. Moffett, *et al.*, Bernstein, *Broadband Update: Narrower "Availability Gap" Points to RBOC/Cable Share Stabilization* at 6 (Aug. 25, 2004).

% Homes Subscribing to Cable Modem. *1999*. *UNE Fact Report 2002* at Figure IV-5 (citing Cable Datacom News, *December 1998 Highlights: Cable Modem Customer Count to Top 500,000 at Year's End* (Dec. 1998), http:// cabledatacomnews.com/dec98-1.htm), *attached to* Comments and Contingent Petition for Forbearance of the Verizon Telephone Companies, CC Docket Nos. 01-338, 96-98, 98-147 (FCC filed Apr. 5, 2002) ("*UNE Fact Report 2002*"). *2002*. *Triennial Review Order* ¶¶ 52, 229 n.695 (9.2 million cable modem subscribers and 108.3 million households). *2004*. See Table 1 in Appendix A for cable modem subscribers; J. Halpern, *et al.*, Bernstein Research, *Broadband Update* at Exhibit 1 (Mar. 10, 2004) (111.2 million households in 2004).

% of Homes with Access to Voice over IP. *2004*. C. Moffett, *et al.*, Bernstein, *Broadband Update: Narrower "Availability Gap" Points to RBOC/Cable Share Stabilization* at 6 (Aug. 25, 2004).

% Homes with Access to 2-Way Satellite Data. *2002 & 2004*. *Triennial Review Order* ¶ 54; Yankee Group, *Residential Broadband: Competition Arrives Via Satellite* at 4 (Dec. 30, 2000). *2004*. Starband Press Release, *Starband Launches New 481 Residential Service* (July 20, 2004) (Starband is a "nationwide" provider of high-speed, two-way satellite data service).

MSAs with Fixed Wireless Broadband. *2002*. *UNE Fact Report 2002* at Table I-1 (citing *Eighth Video Competition Report* ¶ 69; *Sixth CMRS Report*, Appendix A at Table 1; WorldCom Press Release, *WorldCom Launches New High-Speed, Fixed-Wireless Internet Service in Hartford* (Jan. 8, 2001)). *2004*. *See* Appendix G. Fixed Wireless Providers by MSA.

% Pop. in Counties with 3 or more Operators. *1999*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Fifth Report, 15 FCC Rcd 17660, at 6 (2000). *2002*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Seventh Report, 17 FCC Rcd 12985, App. C, Table 5 (2002). *2004*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Ninth Report, Appendix A at Table 5, WT Docket No. 04-111, FCC 04-216 (rel. Sept. 28, 2004).

% Pop. in Counties with 5 or more Operators. *1999*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Fifth Report, 15 FCC Rcd 17660, at 6 (2000). *2002*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Seventh Report, 17 FCC Rcd 12985, App. C, Table 5 (2002). *2004*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Ninth Report, Appendix A at Table 5, WT Docket No. 04-111, FCC 04-216 (rel. Sept. 28, 2004).

% of Pop. Subscribing to Wireless Voice. *1996*. CTIA, *CTIA's Semi-Annual Wireless Industry Survey Results*, http://files.ctia.org/pdf/CTIA_Semiannual_Survey_YE2003.pdf; US Census Bureau, *USA Statistics in Brief – Population by Age, Sex, and Region*, http://www.census.gov/statab/www/poppart.html (1995 Pop.: 266.28 million). *1999*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Fifth Report, 15 FCC Rcd 17660, at 6 (2000). *2002*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Seventh Report, 17 FCC Rcd 12985, at 5 (2002). *2004*. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Ninth Report ¶ 20, WT Docket No. 04-111, FCC 04-216 (rel. Sept. 28, 2004).

% of Pop. Subscribing to Wireless Data. *Triennial Review Order* ¶ 230 n.703; US Census Bureau, *USA Statistics in Brief – Population by Age, Sex, and Region*, http://www.census.gov/statab/www/poppart.html (2002 Pop.: 288.36 million). *2004*. K. Fitchard, *Knowledge Import*, Wireless Review (Jan. 1, 2004) (According to the Yankee Group, there are currently 29 million users of wireless data)); US Census Bureau, *Population and Household Economic Topics*, http://www.census.gov/population/www/index.html (294.33 million people as of Sept. 21, 2004)

Wireless Subscribers Giving Up Wireline. B. Bath, Lehman Brothers, *Consumer VoIP Threat Overdone* at Figure 2 (July 1, 2004).

CLEC Circuit Switches. *1996*. *UNE Fact Report* at I-1. *1999*. *Triennial Review Order* ¶ 436. *1999 & 2002*. New Paradigm Resources Group, Inc., *CLEC Report 2003*, Ch. 4 at Table 14 (17th ed. 2003) (1,154 circuit switches, excluding the 46 circuit switches deployed by Qwest and SBC Telecom, as of year-end 2002). The *Triennial Review Order* found that 1,300 CLEC circuit switches had been deployed based on data that the ILECs had compiled from Telcordia's Local Exchange Routing Guide ("LERG"). *See Triennial Review Order* ¶ 39. Because we were unable to obtain current LERG data, we rely here on New Paradigm's estimates for both current and previous time periods. According to New Paradigm, CLECs had deployed 1,177 circuit switches as of the end of 2003. New Paradigm Resources Group, Inc., *CLEC Report 2004*, Ch. 4 at Table 17 (18th ed. 2004) (excluding the 56 circuit switches deployed by Qwest and SBC Telecom).

CLEC Packet Switches. *1996*. New Paradigm Resources Group, Inc. & Connecticut Research, *1997 Annual Report on Local Telecommunications Competition*, Ch. 2, Table 9 (8th ed. 1996). *1999*. New Paradigm Resources Group, Inc., *CLEC Report 2001*, Ch. 7 at Table 8 (14th ed. 2001). *2002*. New Paradigm Resources Group, Inc., *CLEC Report 2004*, Ch. 4 at Table 19 (18th ed. 2004). New Paradigm estimates that facilities-based CLECs had deployed 8,787 packet switches as year-end 2002, of which 56 switched were deployed by Qwest and SBC Telecom. *2004*. New Paradigm Resources Group, Inc., *CLEC Report 2004*, Ch. 4 at Table 19 (18th ed. 2004). New Paradigm estimates that facilities-based CLECs have deployed 8,800 packet switches as of year-end 2003, of which 56 switches were deployed by Qwest and SBC Telecom.

Homes with Access to Circuit-Switched Cable Telephony. *1999*. *UNE Fact Report 2002* at Table I-1. *2002*. *Triennial Review Order* ¶ 52. *2004*. *See* Section II.C.2.

Circuit-Switched Cable Telephony Subscribers. *1999*. *UNE Fact Report 2002* at Table I-1 (citing NCTA, *Cable Telephony: Offering Consumers Competitive Choice* (July 2001)). *2002*. *Triennial Review Order* ¶ 52. *2004*. Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of December 31, 2003* at Table 5 (June 2004).

Average Number of CLEC in Top 50 MSAs. *1999*. New Paradigm Resources Group, Inc., *CLEC Report 1999*, Ch. 8 (10th ed. 1998). *2002*. New Paradigm Resources Group, Inc., *CLEC Report 2002*, Ch. 6 (15th ed. 2001). *2004*. New Paradigm Resources Group, Inc., *CLEC Report 2004*, Ch. 5 (18th ed. 2004).

Route Miles of Fiber. *1996*. New Paradigm Resources Group, Inc. & Connecticut Research, *1997 Annual Report on Local Telecommunications Competition*, Ch. 2 at Table 5 (8th ed. 1996). *1999*. *Triennial Review Order* ¶ 42. *2002*. The 2002 route miles statistics is based on numbers reported by NPRG in *CLEC Report 2004* for year-end 2002, including a deduction of 43,525 route miles from NPRG's 2002 route miles statistic of 326,883. The 43,525 deduction is made to account for instances where NPRG reports a carrier's total route miles (both local and long-haul) where a local route miles statistic is available (carriers adjusted are: Buckeye Telesystem (-1,563), McLeodUSA (-23,500), MCI (-1,937), TelCove (-10,486), and Time Warner Telecom (-6,039)). Both the 2002 and 2004 statistics count CLECs included by NPRG, but not included in Table 1 of Section III (accounted for as part of the "other" statistic). The 2002 total also includes the current route miles statistics for Yipes and Level 3 because they are not included in the CLEC Report for either 2002 or 2003. Therefore, to create an apples-to-apples comparison they have been included in the 2002 calculation (adding 25,000 route miles to the total of 283,358) since they are counted in our current route miles statistic. *2004*. *See* Table 1 of Section III.

Buildings Served Directly by CLEC Fiber. *1996*. New Paradigm Resources Group, Inc. & Connecticut Research, *1997 Annual Report on Local Telecommunications Competition*, Ch. 2 at Table 6 (8th ed. 1996). *2001*. *UNE Fact Report 2002* at IV-4 (citing Joint Comments of Allegiance Telecom, Inc. and Focal Communications Corporation at 25, *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98 (FCC filed June 11, 2001); Comments of WorldCom, Inc. at 7, *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98 (FCC filed June 11, 2001)). *2004*. See Table 1 in Section III.

Table 2. Bundled Service Offerings

See sources for Table 4 of Section II & Appendix B.

Table 3. Independent Analysts Agree That Intermodal Competition Is Real While UNE-P Is Irrelevant

Morgan Stanley. S. Flannery, *et al.*, Morgan Stanley, *A New Day in Telecom Land* at 3 (July 23, 2004). ***Fulcrum***. G. Miller, *et al.*, Fulcrum Global Partners, *Wireline Communications: Revising BLS and SBC Estimates Due to AWE Dilution* at 2 (Mar. 10, 2004). ***Legg Mason***. M. Balhoff, Legg Mason, Prepared Statement before the Subcommittee on Telecommunications and the Internet of the House Committee on Energy and Commerce, Washington, DC at 5 (Feb. 4, 2004). ***Deutsche Bank***. V. Shvets, *et al.*, *Wireline Services: 1Q04 Review: Fragile Stability* at 3 (May 17, 2004). ***CIBC World Markets***. T. Horan, *et al.*, CIBC World Markets, *Solicitor General & FCC Majority Won't Appeal UNE-P Overturn* at 3 (June 10, 2004).

Table 4. Local Access Points for Residential Customers

BOC Retail & Resale/UNE-P. Verizon, *Investor Quarterly: 4Q02* at 13 (Jan. 29, 2003); Verizon, *Investor Quarterly: 2Q* at 13 (July 27, 2004); SBC, *Investor Briefing* at 18 (Jan. 27, 2004) (revised results for 4Q02); SBC, *Investor Briefing* at 15 (July 22, 2004); BellSouth Corp., *Financial Statements 4Q02*, http://www.bellsouth.com/investor/pdf/4q02p.pdf; BellSouth Corp., *Financial Statements 2Q04*, http://www.bellsouth.com/investor/pdf/2q04p.pdf; Qwest, *Fourth Quarter Financials 2002* at Att. E, http://media.corporate-ir.net/media_files/NYS/q/4Q02WebFinancials.xls; Qwest, *Second Quarter Financials 2004* at Att. D, http://media.corporate-ir.net/media_files/NYS/q/reports/2Q04_Attachments_ABCD.xls.

Wireless Displacement. B. Bath, Lehman Brothers, *Consumer VoIP Threat Overdone* at Figure 2 (July 1, 2004).

Cable Modem. R. Bilotti, *et al.*, Morgan Stanley, *Broadband Update: Bundling Is an Arms Race, Not a Price War* at Exhibit 7 (July 8, 2004) (2002); M. Rollins, *et al.*, Citigroup, *Telecom Tidbit: Updating HIS Share Analysis for Recent 2Q Results* at 4 (Aug. 16, 2004) (2Q04).

Cable Telephony and VoIP. B. Bath, Lehman Brothers, *Consumer VoIP Threat Overdone* at Figure 2 (July 1, 2004).

DSL. R. Bilotti, *et al.*, Morgan Stanley, *Broadband Update: Bundling Is an Arms Race, Not a Price War* at Exhibit 7 (July 8, 2004).

Table 5. Local Access Points for Enterprise Customers

BOC Switched and Dedicated. Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of December 31, 2003* at Table 2 (June 2004) (33.1 million ILEC business switched access lines as of Dec. 2003; 38.6 million ILEC business switched access lines as Dec. 2001); FCC, *Statistics of Communications Common Carriers 2002/2003 ed.*, at Table 2.6 (Feb. 2004) (93 million BOC special access lines as of year-end 2002); FCC, *Statistics of Communications Common Carriers 2001/2002 ed.* at Table 2.6 (Sept. 2002) (78 million BOC special access lines as of year-end 2001).

BOC Retail Switched and Dedicated. Ind. Anal. & Tech. Div., WCB, FCC, *Local Telephone Competition: Status as of December 31, 2003* at Table 2 (June 2004) (33.1 million ILEC business switched access lines as of Dec. 2003; 38.6 million ILEC business switched access lines as Dec. 2001); FCC, *Statistics of Communications Common Carriers 2002/2003 ed.*, at Table 2.6 (Feb. 2004) (93 million BOC special access lines as of year-end 2002); FCC, *Statistics of Communications Common Carriers 2001/2002 ed.* at Table 2.6 (Sept. 2002) (78 million BOC special access lines as of year-end 2001). Assumes that the BOCs provided 36.4 percent (28.4 million in 2001; 33.8 million in 2002) of their voice-grade equivalent special access lines directly to end users – which is the same percentage of special access revenues they generated from end-users in 2002, the most recent year for which data is available. *See* J. Lande & K. Lynch, Ind. Anal. & Tech. Div., WCB, FCC, *Telecommunications Industry Revenues 2002* at 14 (Table 5, Line 305) and 18 (Table 6, Line 406) (Mar. 2004).

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Table 6. CLEC Reporting of Voice-Grade Equivalent Lines

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II. FACILITIES-BASED COMPETITION FOR MASS-MARKET CUSTOMERS

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III. COMPETITION FOR HIGH-CAPACITY FACILITIES AND SERVICES

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